

THE RAILWAY GAZETTE

A Journal of Management, Engineering and Operation
INCORPORATING

Railway Engineer • TRANSPORT • The Railway News

The Railway Times • Herapath's Railway Journal • RAILWAY RECORD.

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GOODS FOR EXPORT

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as indicating that they are available for export

NOTICE TO SUBSCRIBERS

Consequent on the paper rationing, new subscribers cannot be accepted until further notice. Any applications will be put on a waiting list and will be dealt with in rotation in replacement of subscribers who do not renew their subscriptions

POSTING "THE RAILWAY GAZETTE" OVERSEAS

We would remind our readers that there are many overseas countries to which it is not permissible for private individuals to send printed journals and newspapers. THE RAILWAY GAZETTE possesses the necessary permit and facilities for such dispatch.

We would emphasise that copies addressed to places in Great Britain should not be re-directed to places overseas

TO CALLERS AND TELEPHONERS

Until further notice our office hours are: Mondays to Fridays 9.30 a.m. till 4.45 p.m.

The office is closed on Saturdays

ANSWERS TO ENQUIRIES

By reason of staff shortage due to enlistment, we regret that it is no longer possible for us to answer enquiries involving research, or to supply dates when articles appeared in back numbers, either by telephone or by letter

ERRORS, PAPER, AND PRINTING

Owing to shortage of staff and altered printing arrangements due to the war, and less time available for proof reading, we ask our readers' indulgence for typographical and other errors they may observe from time to time, also for poorer paper and printing compared with pre-war standards

Steps to Assist British Export Trade

THREE steps in an endeavour to assist the revival of Great Britain's post-war export trade have been announced by Mr. Harcourt Johnstone, Secretary of the Department of Overseas Trade. The practice of holding a British Industries Fair is to be resumed as soon as possible after the defeat of Germany; a special type of "market officer" is to be employed by the Department to collect information and seek suitable agents for United Kingdom goods; meetings of the Overseas Trade Development Council are to be resumed, and the names of 16 prominent industrialists have been announced as members of that Council. Reports supplied by the overseas officers of the Department dealing with the economic conditions in individual markets will be on sale early in the New Year, and there is to be a steady flow of these reports which will cover 26 countries. Mr. Harcourt Johnstone, in giving an outline of these developments to the Institute of Export recently, declared that the Department would go on trying to improve its services in every direction. It was very conscious of special difficulties which exporters had to face because of control of export materials, export licensing, and numerous other difficulties besetting overseas trade.

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Overseas Trade Development Council

In the House of Commons on December 12 Mr. Harcourt Johnstone stated that the terms of reference of the Overseas Trade Development Council, which is to meet regularly under his chairmanship were: "To study methods of export trade promotion and the nature and extent of Government support, more especially through the Department of Overseas Trade, to the development of our export trade." The members of the Council are: Mr. A. J. Boyd, who is Managing Director of the Metropolitan-Cammell Carriage & Wagon Co. Ltd.; Mr. Angus D. Campbell, who is on the board of the Manchester Ship Canal Company; Mr. Francis B. Duncan, a director of the Gramophone Co. Ltd.; Lord Glenconner, a director of Imperial Chemical Industries; Lt.-Colonel Francis M. G. Glyn, who is on the board of the London Midland & Scottish Railway Company; Mr. Arthur R. Guinness, of Guinness Mahon & Company, merchant bankers; Mr. E. H. Lever, Chairman of Richard Thomas & Co. Ltd.; Mr. Charles F. Merriam, Chairman of British Xylonite Co. Ltd.; Sir John G. Nicholson, a director of Imperial Chemical Industries Limited; Mr. George W. Odey, Chairman of Barrow Hepburn & Gale Limited; Sir Harry Railing, Chairman of the General Electric Co. Ltd.; Sir Eugene Ramsden, Chairman of A. & S. Henry & Co. Ltd.; Lord Riverdale, Chairman & Managing Director of Arthur Balfour & Co. Ltd.; Sir William Rootes, Chairman of the Rootes-Humber-Sunbeam-Hillman-Commer-Karrier group of companies; and the Hon. Josiah Wedgwood, who is Managing Director of Josiah Wedgwood & Sons Ltd. and a member of the Court of the Bank of England.

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Trade Opportunities in South America

The scope for British trade in the countries of South America was dealt with by Lord Wardington in his Chairman's address at the annual meeting of the Bank of London & South America Limited. The past year in Argentina was marked again by economic prosperity. Thanks to very large purchases by the United Kingdom and the United States of farming products, exports had been running at very high levels, and the favourable trade balance for the first eight months of this year was equivalent to more than £55,000,000 sterling, ensuing on £73,000,000 for 1943. Brazil's favourable trade balance for the first seven months of 1944 was equivalent to £19,000,000 sterling, following on £33,000,000 for 1943. It was reasonable to assume that the large accumulated balances in dollars and sterling would be liquidated as soon as it was possible to purchase goods for import. Advances from branches of the bank showed clearly that South America generally was eager to obtain renewed supplies of goods from the United Kingdom, but British industries' ability to respond to this demand continued to be circumscribed largely by existing wartime controls. Lord Wardington believed that it was essential that British goods should not be placed in overseas markets in quantities that were too few or too late to establish a solid rehabilitation of our export trade, and he declared that British industry now urgently awaited the Government's plan for a sustained and determined drive.

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Argentine Railway Receipts Improvements

Statistics made available in Buenos Aires, and cabled to this country, show that there has been a considerable improvement in the revenue position of the privately-owned railways in the year to June 30 last. The figures include those of the four non-British railways, but exclude those of the State lines. Revenue is given

as 525,013,243 pesos, against 469,284,677 pesos in the previous year, and 386,680,280 pesos in the year to June 30, 1940. Working expenses reached a peak level of 430,117,755 pesos, which compares with 377,405,608 pesos for the previous year, and 310,219,757 pesos in 1939-40. The general deficit of 39,993,346 pesos was the lowest for several years, and compared with 41,325,562 pesos for the previous year, and the peak deficit of 73,617,221 pesos in 1940-41. It will be recalled that as a result of Sir Montague Eddy's negotiations with the Government, the British-controlled railway companies have been given an improved exchange rate of 14-15 against 16-15 pesos to the £ for financial remittances to London, and one of 14 compared with 15 for payments of imported materials.

Overseas Railway Traffics

According to official announcements the traffic receipts of the British-owned railways in Argentina for the 23rd week of the financial year include the proceeds of the 10 per cent. increase in goods rates, which became operative on December 1, 1944, offset by increases in wages and salaries. Brazilian railway receipts, especially on the Great Western, continue to show improvement, and for the 49 weeks to December 9, 1944, the Great Western aggregate of £1,095,800 is £258,800 higher than that for the corresponding period of 1943, and the Leopoldina total of £2,287,821 is £524,433 better. The report of the Taita Railway for the year to June 30, 1944, shows a credit balance of £1,902, with an improvement in gross receipts of £16,513. From July 1 to October 31, 1944, however, there has been a decrease in receipts of £11,515, because the production of nitrate is now reduced to a minimum, after the closing down of Oficina Santa Luisa. The mileage open is now 156, against 160.

	No. of week	Weekly traffics	Inc. or dec.	Aggregate traffic	Inc. or dec.
Buenos Ayres & Pacific*...	23rd	133,800	+ 28,800	2,747,160	+ 541,560
Buenos Ayres Great Southern*	23rd	205,680	+ 20,400	3,955,860	+ 242,280
Buenos Ayres Western*	23rd	69,000	+ 10,800	1,516,320	+ 289,740
Central Argentine*	23rd	164,880	+ 2,748	3,872,619	+ 595,629
Canadian Pacific ...	48th	1,159,800	- 76,400	59,815,600	- 4,614,400

* Pesos converted at 16½ to £

The Canadian Pacific records decreases in receipts for the 47th and 48th weeks of 1944 amounting together to £208,800.

Post-War Tourist Trade and Hotels

Some interesting comments on post-war tourist trade and the part played by hotels, were made by Major M. Gluckstein in his statement to shareholders of the Strand Hotel Limited, issued with the report and accounts. At this stage of the war the prospect of peacetime visitors to this country again becomes of interest to the hotel industry, and Major Gluckstein urged that an endeavour should be made to create in the minds of the vast number of allied, dominion and colonial people within our shores today, the best impression of our country and its ability to cater for the comfort and enjoyment of its guests. There is a danger that the recollection of wartime conditions will discourage the return of these potential tourists of tomorrow, for bad impressions die hard. In view of the increasing recognition which is being accorded the importance of the tourist trade in the national economy, there is good ground for Major Gluckstein's suggestion that it would be prudent now to relax restrictions wherever possible, and so raise by some degree the standard by which we are judged. The post-war tourist trade in this country is a matter of first class importance to the British railways, not only from a travel viewpoint, but also because they are proprietors of hotels on a large scale.

Canadian Railway Plans for Post-War Services

The Canadian Railways, in the post-war period, will move to meet opposition, and to regain, retain, and create passenger traffic, according to a statement made by Mr. A. A. Gardiner, General Passenger Traffic Manager, Canadian National Railways, when he was addressing the members of the Canadian Industrial Traffic League a few weeks ago. He outlined briefly some of the post-war plans which are under consideration. Those with the object of attracting passengers include well-timed low-fare excursions; a simplification of the rates of return tickets and of the time limitations applying to their use; and reduced rates for quantity purchase. To provide greater attractions for actual passengers, it is intended to increase the speed of trains and the frequency of service; to provide improved carriages, sleeping cars, and station facilities; to arrange reserved seats in coaches; to provide "popular-priced" meals on trains; and to give a more convenient arrangement of tables in dining cars. Ancillary plans now contemplated for the additional convenience of passengers are an extension of checked luggage privileges, and the provision

of increased garage facilities at stations. It is not unlikely that these plans have been influenced in some measure by the fact that the Canadian Government has decided that railways are not to be permitted to continue participation in air transport.

American Railway Safety

An award of an unprecedented kind, in the annals of the railways of the United States, has been the "Certificate of Special Commendation" presented recently by the American Museum of Safety to the entire railway industry of the country. At the presentation, speakers stressed the fact that in 1943, despite the severe pressure of war conditions, and the handicap of much substitute labour, fatalities to passengers travelling by train averaged 3 to every billion passenger train-miles, and staff fatalities averaged 1½ to every billion ton-miles of traffic handled; on this basis of reckoning passengers were three times as safe, and employees six times as safe, in this war as in the last. Criticisms had been made of the railways on safety grounds, but one speaker gave it as his opinion that "much of this comment is inspired by over-zealous methods of salesmanship employed by eager owners of patented articles, anxious to increase their sales." A typical example of such criticism was after the wreck of the "Advance Congressional" near Philadelphia, attributed by critics to the absence of roller bearings on the car which ran hot and derailed; but, as this speaker said, "the public was not told that on this same train, a few months previously, a car using roller bearings had a similar accident, but fortunately not at a place where the derailed car struck an impenetrable obstacle"—a reference to the overhead gantry with which the derailed car collided, causing most of the casualties.

Railway Fuel Economies

Excluding locomotive and electric traction, the latest figures issued by the main-line railways and London Transport show that they are at present effecting annual economies in the use of coal to the extent of about 140,000 tons. Among the principal directions in which coal saving has been effected are: 9,000 tons by the use of smoke-box "char" (half-burned coal which collects in the smokebox of an engine); 14,000 tons by economies in railway hotels; 54,000 tons by increased efficiency and economy in railway workshops; and 62,000 tons by economies in office and station lighting and heating arrangements. Other savings which do not lend themselves so readily to measurement probably amount to a further 50,000 tons. In addition, savings of more than 130,000 tons have been made in locomotive and electric traction user, thus: 14,000 tons by the use of waste wood as alternative fuel; 31,000 tons by deferring the beginning of heating on trains, and ceasing it sooner; and 90,000 tons by economies at electric power houses, and by reducing the use of current on electric trains. The railways thus claim total annual economies of roundly 324,000 tons of coal. The Inter-Railway Fuel Efficiency Committee, and thousands of voluntary fuel watchers, are attempting to achieve still further economies this winter.

Cornish Engines Preservation Society

A movement was initiated in 1935 by a number of enthusiasts who formed a committee to preserve a winding engine at Levant Mine, St. Just, designed by Francis Mitchell, and constructed by Harvey & Company, Hayle, in 1840. This engine has several distinctive features apart from its long service, which lasted until 1930. The committee was successful in raising sufficient funds, and since then has been active in preventing other historic objects disappearing, and in compiling records of Cornish engines in various parts of the country. Despite salvage needs, the Ministry of Supply has been sympathetic. At a meeting on May 12, 1943, the committee decided to widen its scope and establish a museum at East Pool in the Camborne-Redruth area. The movement then developed into the Cornish Engines Preservation Society, which was inaugurated at a meeting at Murdock House, Redruth, on July 19 last, and held its first annual meeting in the Camborne School of Mines on November 18. The President is Lord Falmouth; Mr. A. Treve Holman is Chairman; and Dr. H. W. Dickinson (Joint Honorary Secretary of the Newcomen Society) is Vice-Chairman. The Secretaries are Mr. W. Tregoning Hooper (The Observatory, Falmouth), and Mr. W. M. Mitchell (3, Coach Lane, Redruth).

The Yellow Light in Sweden

The signal aspects used on the Swedish State Railways, although based on Central European practice, nevertheless have presented some interesting features of their own, especially since the step was taken of signalling shunt movements by position-

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light signals and, while retaining the trailability of the points, at all stations of consequence getting rid of the point indicators once universally used. Sweden's example was followed in this respect by Norway and Denmark, but whereas they had adopted the yellow light as a caution indication Sweden, after making some experiments with it, decided not to do so. It retained the red, green and white system of lights, but to prevent any confusion, made its distant signal lights flashing. Thus it comes about that a flashing green light indicates that the next signal is red and a flashing white light is used as the clear distant indication—outer or inner—at a station. Experiments some time since with a mechanical 3-aspect distant were not very successful, but the adoption of light signals, and the increase in the speed of the trains, has revived interest in the question, with the result that the yellow light has been re-introduced as a running indication. When the distant has to indicate that the home signal is off for a diverging route a steady yellow light appears below its flashing white.

Locomotive Smokebox and Boiler Proportions

A paper on smokebox design is always welcome to the locomotive engineer, because it may throw a little more light on what is still the most baffling and mysterious part of the locomotive, where steam and hot gases, so rigidly segregated during their earlier existence, finally mix in the vital vacuum-forming process on which the subsequent motion of the machine depends. No other item in the locomotive is less amenable to rational treatment; and no other part, in service, is more capricious in its influence on the general behaviour of the machine as a whole. It is quite probable that the smokebox contains the reason why sister locomotives, apparently alike in all respects, may differ profoundly in their performance on the road. In an attempt to find a rational relationship between the proportions of the chimney and blast pipe, on the one hand, and the boiler proportions on the other, Mr. D. W. Sanford, an abstract of whose paper before the Institution of Locomotive Engineers is on p. 622, seeks to build from first principles the basic equations governing chimney and blast-pipe areas. Much scattered work has been done on the subject in the past, chiefly by various railways; we recall the valuable trials carried out by William Adams on his large 4-4-0s on the L.S.W.R. in 1891 (incidentally it is good to find his "vortex" blast pipe in such excellent company as the Kylchap in Mr. Sanford's paper), and the careful tests by George Hughes on blast pipes on the L.Y.R. during the early years of this century. Mr. Sanford's paper should prove to be a useful and well-timed stimulus to further research into this fascinating subject after the war.

Buenos Ayres & Pacific Railway Company

THE accounts for the year ended June 30, 1944, show that there was an increase of £742,340 in receipts, but this was more than offset by a rise of £944,562 in working expenses, so that the net receipts were lower by £202,222. These figures are arrived at after conversion into sterling at the par value of the gold dollar. Exchange differences, however, were £647,535, against £702,950. Adding £135,679 balance of interest, etc., account, makes £866,690 available for distribution. Interest on the first debenture stocks of the company, the Argentine Great Western and the Villa Maria & Rufino Railways, and on the second debenture stocks of this company and the Argentine Great Western have been paid on the due dates. Payments of arrears on the 4½ per cent. consolidated debenture stock of this company and on the 5 per cent. debenture stock of the Argentine Great Western have been brought up to January 1, 1940, and April 1, 1940, respectively. For the year under review the debit balance was £1,036,968, bringing the total balance at debit of revenue account to £11,475,244. Some operating figures follow:—

	1942-43	1943-44
Average miles open	2,807	2,773
Passengers	15,975,874	18,267,762
Tons of goods (metric)	3,819,565	3,811,309
Net profit per train-mile	3s. 11½d.	3s. 3½d.
Operating ratio, per cent.	78.98	83.32
Passenger receipts	£ 1,072,963	£ 1,283,274
Goods receipts	5,240,073	5,682,127
Gross receipts	7,521,179	8,265,519
Working expenses	5,940,411	6,884,973
Net receipts	1,580,768	1,378,546

Total receipts from passengers showed an increase of £210,311, or 19.60 per cent., and the first class receipts of £600,540 represented 48.82 per cent. of all passenger receipts exclusive of Government traffic. Goods and livestock receipts improved by £418,549, or 8.60 per cent. In working expenses the chief feature was the increase of over £800,000 in locomotive running.

This item shows the following progression since 1939-40: £1,531,000, £1,690,000, £2,047,000 to £2,878,000 in the year under review, and explains the decrease in profits in spite of expanding receipts.

Central Argentine Railway Company

THE report for the year ended June 30, 1944, shows that against the increase of £1,854,097 in gross receipts there was an advance of £1,189,727 in working expenses, due mainly, apart from the additional cost of working heavier traffics, to an increase of £310,153 in the provisions for renewals, a higher wages bill, and the ever rising costs of materials and fuel. The fuel bill was £2,350,903, an increase of £708,000 over the previous year, and of £1,609,000 over 1939-40. Merchandise tonnage was 28.6 per cent. heavier and the receipts therefrom were 32.5 per cent. higher, while the tonnage of products increased by 5.4 per cent., bringing an increase of 19.9 per cent. in receipts. Some operating figures are compared in the accompanying table:—

	1942-43	1943-44
Passenger receipts	£2,728,108	£3,076,656
Public goods traffic, tonnes	7,154,959	7,612,737
Public goods traffic, receipts	£6,106,329	£7,386,549
Livestock receipts	£471,578	£584,954
Gross receipts	£10,305,329	£12,159,426
Working expenses	£8,619,350	£9,809,077
Net earnings	£1,685,979	£2,350,349
Operating ratio per cent.	83.64	80.67

Exchange differences accounted for £846,895, against £623,403 in the previous year. Sundry credits, amounting to £18,172, brought the total net income to £1,521,626. All arrears of interest now have been cleared from the 4 per cent. debenture stock, and the half-year's interest due on January 1, 1945, will be paid on the due date. The scheme of arrangement dated November 21, 1940, is now extended to December 31, 1945. There is a credit balance of £287,604 on the year's working, which compares with a debit of £154,622 for the previous year.

Station Signs and Nameboards

IN recent years a considerable amount of attention has been given to the design and display of clear and prominent station nameboards and announcements, and it is only by contrasting conditions of 30 years ago with those obtaining on the outbreak of the present war—that is, after a quarter of a century of progress—that the enormous strides taken in this period can be appreciated, but events of the past few weeks have attracted attention to the subject. One is that conditions have now made it possible to reintroduce satisfactory signs, which for four years were required to be obliterated for security reasons. The other is that on November 26 died Mr. Edward Johnston, the expert on typography, whose work has played such a prominent part, both direct and indirect, in bringing about the modern state of affairs. Primarily, credit must be given to the late Mr. Frank Pick for initiating the development. During the Victorian era, the quiet distinction of English 18th century printing had been abandoned for more florid and ornamental lettering, of which legibility was not the primary characteristic, but, before the last war, Frank Pick's activities with the Underground Group of Companies had resulted in the wide adoption of Grotesque type, without serifs. This did not entirely satisfy him, so in 1916 Pick discussed his ideas with those who were well versed in lettering and printing, and as a result was introduced to Edward Johnston. To him was entrusted the task of evolving a style of lettering to be used exclusively for letterpress announcements of the Underground Group of Companies, which would allow maximum legibility with the maximum compression. Johnston worked on his script for a long time, and at last it was ready in the summer of 1916 (in capitals as well as lower case). He had condensed certain letters of the alphabet, and expanded others, and had produced a distinctive 20th century Sans, based as far as possible on squares and circles, and intended as a display type. It has never been used extensively for text printing and no font of it exists smaller than 36 point, or letters approximately ⅓ in. high. From the beginning, its use has been confined to the Underground Group of Companies, from which it was inherited by the London Passenger Transport Board.

Its effects on London station nameboards and poster announcements has been profound and widespread, and something of the

contrasts of a quarter of a century may be gathered from the illustrations we reproduce on page 630. The use of Johnston's work in London had its repercussions in Central Europe shortly after the last war, and in Germany comparable developments were noteworthy during the period from 1922 to 1928. In passing, it may be remarked that such effects have been largely obliterated during the Nazi regime with its insistence on the adoption of mediæval gothic lettering, which is not readily legible, even to Germans, whatever æsthetic attraction it may have. In our own country, one of the most striking effects of Johnston's work was the development by Eric Gill of his famous Gill Sans for the Monotype Corporation in 1928; Gill frankly admitted that his alphabet was not more than the judicious revision of Johnston's. Within a few years the machine-set Gill Sans became a favourite, and has retained its popularity.

Gill Sans was officially adopted by the L.N.E.R. in 1932, and that company invited Eric Gill himself to design a totem of the letters "L.N.E.R.," in the same way that Johnston had produced the famous Underground bar-and-circle device. Before the present war, good progress had been made by the L.N.E.R. in the standardisation of this Gill lettering, not only for station nameboards, but also for poster announcements and similar purposes. The present introduction of adequate signs is making it possible for the L.N.E.R. to introduce improved standard designs of station nameboards, but still with Gill lettering, and on page 611 of our December 15 issue we reproduced two views showing respectively a pre-war sign at Shenfield, and a new experimental type recently erected at Finsbury Park, both of which embody white Gill Sans letters on a blue background. Although we have mentioned in particular the activities of London Transport (and its predecessors) as the pioneer, and the L.N.E.R. as the direct successor of the same tradition, it should not be overlooked that noteworthy comparable steps have been taken by the Southern Railway and the L.M.S.R.

Extensive Use of Formation Grouting

THE use of cement grouting as a cure for unstable railway formation—then in the experimental stage—we described and illustrated on November 19, 1943. So successful has this remedy proved, that the Atchison, Topeka & Santa Fe Railway is treating no fewer than 100 miles of line in this year's programme. It may be remembered that this grouting is not intended to provide a concrete slab under the ballast, but to stabilise the existing formation by driving out from it all free water and semi-liquid soil, which surges under passing trains. In fact, pressure grouting has a double function, as it not only expels this liquid, but, by filling all the voids and setting in them, it seals them against penetration of further water by pumping action from below, and also from above. The grout, which is usually one part cement to five parts of sand, forms with the lower ballast a cemented mass that distributes the load evenly over the formation. To accomplish a 100-mile job this year, ten grouting plants are working simultaneously. The programmed rate of progress is 440 ft. a plant *per diem*, or $\frac{1}{2}$ mile by all ten sets. Part of the process is the removal after grouting of all ballast down to 8 in. below bottom of sleeper level and its replacement with clean ballast. Opportunity is also being taken to relay these 100 miles of 112-lb. rail with 131-lb. section.

The original grouting sets used pneumatic pressure, but, subsequently, hydraulic plant was designed and gradually improved upon by the Santa Fe engineers. After an exhaustive trial period with two of these sets, it was considered desirable to develop the process by using plant manufactured on a commercial scale. Seven sets, built by the Koehring Company of Milwaukee, are now in use on the 100-mile programme. Each set of equipment is sent by rail on a flat car to the site, together with a tool van and living van for the gang. It consists of a tractor or four-wheel-drive lorry, a two-stage compressor, and a grout mixer and pump equipped with a hoisting device and charging hopper. Apart from the compressor, all this gear is mounted on the tractor or lorry. The grout supply piping is about 300 ft. long and is of five-play $1\frac{1}{2}$ -in. hose with couplings of the Westinghouse brake train-pipe pattern. The grout injection and bull points are now driven by pneumatic hammers fed through up to 300 ft. of $\frac{3}{4}$ -in. air hose piping. A normal grouting gang consists of a foreman, machine operator, lorry driver, and from 7 to 20 gangmen.

The bull points are first driven, and, after they have been extracted by a claw bar or pole and chain, their places are

taken by the injection points, the orifices of which should be at or near the level of the bottom of the ballast. The grout is pumped in until it begins to exude from neighbouring disconnected points or from the formation. Injection points may be from 18 in. to 7 ft. apart, according to circumstances. They must be sufficiently near together to insure a thorough permeation of all the intervening formation material. A carefully-screened very fine sand must be used, mixed with any ordinary or special cement. The usual specification for this sand is that 90 per cent. shall pass through a 50-mesh sieve, 65 per cent. through a 65-mesh, and 10 to 15 per cent. through a 100-mesh sieve. The normal volume of water used is equal to that of the cement and sand together.

The water pockets which grouting eliminates are found in single and double line formation in fill, in cutting, and on sided-long ground, and in all cases the remedial process has proved effective. Track maintenance costs have been reduced by grouting by from 30 to 80 per cent., and many speed restrictions have been removed. Lengths of grouted track have been subjected to abnormal rainfall—3 in. on one occasion, three days and nights of heavy rain on a second, and a record rainfall on the third—but in no instance has detailed inspection shown that any special attention to the track has been required. The life of the sleepers has been found to be prolonged, the rails and fittings subjected to less wear, and the riding of the track has been markedly improved wherever grouting has been undertaken. The cost has been worked out as an over-all average of approximately 2s. 1d. per foot run for a 22-mile single-line section grouted on the Santa Fe Railway, or about £550 a mile, assuming that 1s. = 5s. As well as varying inversely as the extent of the grouting undertaken, this figure will vary somewhat in different countries, according to costs of plant, material, and labour, but if it can be relied upon to secure all the advantages claimed for the process, it certainly seems moderate.

Association of American Railroads

ON a later page of this issue is an article describing the constitution of the Association of American Railroads. It will be seen that the association keeps watch and ward over the interests of its members in much the same way as the Railway Companies Association safeguards our railways. The activities of the American body, however, go far beyond the scrutiny of legislative measures and the consideration of the policy to be followed as to proposals affecting the railways. The A.A.R. has a permanent staff of over 800 engaged on several vitally important branches of work, such as railway economics and statistics, research and the interchange of freight wagons, with all the complications of providing for the even flow of main streams of traffic and of handling wagon hire, demurrage and repair matters. Again, the law department of the association acts for member railways in a great variety of subjects where Government agencies are concerned.

Mr. R. V. Fletcher, who has been Chief Legal Adviser & General Counsel since 1934, has argued every one of the general rate cases which have been before the Interstate Commerce Commission during the last ten years. Our article is based on evidence which he gave recently before a sub-committee of the Senate. Mr. Fletcher stated at the hearing that he felt keenly the public nature of railways, which had become so much a part of the financial structure of the United States that anything affecting the financial operation of railways made itself felt throughout the entire country. That explains why the A.A.R. is a powerful factor in the business world and why its constructive work is likely to have a great influence on the future development of transport.

From Mr. Fletcher's statement it would appear that the A.A.R. is invaluable as a means of linking the railways together, improving their methods and eliminating waste from their operations. It was therefore astonishing to hear that the Department of Justice has instituted proceedings against the association on the ground that its activities constitute a breach of the Anti-Trust Act. Under the Interstate Commerce Act the railways are subject to very close regulation by the Interstate Commerce Commission and so stand on a different footing from ordinary industries. We hope, therefore, that the A.A.R. will have no difficulty in establishing its right to discharge the functions which it has carried out, with the full knowledge of the I.C.C., during the past eleven years.

Post-War Recruitment of Civil Service and Railway Staff

TEMPORARY CIVIL SERVANTS

ON February 17 the Chancellor of the Exchequer made a statement in the House of Commons about recruitment for the Civil Service in the immediate post-war period. Sir John Anderson said that the number of established civil servants was 290,000 in April, 1939. Of that number 70,000 were absent on war service and 215,000 were still employed, though many of them were at or over the normal working age. After the war the complexity of organisation for many years would be greater than it was in 1939, and the Civil Service would have to be reinforced by a steady flow of recruits of good educational standards. At first the main source of recruits should be from the people who had gone straight into war service from school or university and had missed the chance of competing for Civil Service posts. Generous treatment should be given to suitable candidates from the Forces and care should be taken to see that their war service did not place them at a disadvantage in sitting for the competitive examinations which would be resumed at the earliest possible moment. The Government had referred the subject to the National Whitley Council with a request that specific proposals should be submitted for carrying matters forward.

The official and the staff sides of the Council have been able to agree a report dealing with three important grades of civil servants—

- (a) clerical staff who enter ordinarily at the age of 16 to 17;
- (b) the executive class who enter at the ages of 18 and 19; and
- (c) the administrative class who are appointed at the ages of 20 to 24.

The report has been approved by the Government and has been published in a White Paper (Cmd. 6567) with a covering statement commending its proposals to Parliament and to the public. As somewhat similar problems will arise on the railways at the end of the war, it may be useful to many readers to have a summary of the arrangements suggested for these large sections of the Civil Service staff.

RECONSTRUCTION COMPETITIONS

The Council considers that the customary competitions for vacancies should be reopened as soon as practicable for young men and women who are of the prescribed ages for candidates. Sufficient recruits should be obtained from this source to fill vacancies which arise after the end of European hostilities in the normal course of events. In addition a large number of vacancies will have accrued during the war by wastage and the expansion of some existing services. These "accrued vacancies" should be filled mainly by recruits who missed their opportunity of competing for the Civil Service because of the war. "Reconstruction competitions" should therefore be started for these older people and should extend over a period of years, so as to give all men a chance of sitting as they are released from the Forces. For these candidates the normal age limits will be extended by five years, provided that the war ends in 1944, or by such longer period as the process of release entails in particular cases. Special arrangements will be made also for men and women who are not more than a year over these higher age limits and are still young enough to be trained for a new career.

Candidates will be required to possess the educational qualifications set out below:—

- (a) *Clerical class*.—Full-time education up to age 16 or the holding of a school certificate;
- (b) *Executive class*.—Full-time education up to age 17 or the possession of a higher school certificate;
- (c) *Administrative class*.—A university degree with first or second class honours or full-time education up to age 18 with at least one year's continuous full-time attendance at a university.

The reconstruction competitions should consist of written examinations in general subjects, together with an interview for the executive and administrative classes. Ex-service men will be guaranteed one-half of the vacancies in the clerical grade, two-thirds in the executive class and three-quarters in the administrative class. Similar consideration will be given to women.

Any temporary civil servant, whatever his rank, who is within the age limits set out above, will have to take the appropriate examination in order to secure an established post. Exceptions, however, should be made in the case of older temporary civil servants who have shown outstanding executive or administrative ability and of other temporary people who brought into the service a special knowledge or experience of particular value. The best of these temporary occupants of senior posts, who are willing to stay, should be retained and established. Provision should also be made for the establishment of the pick of the temporary officers in junior grades, who are over age and have at least two years' service, by allotting to them 15 per cent. of the vacancies in the basic clerical and executive grades.

PROMOTION OF ESTABLISHED CIVIL SERVANTS

Before the war an established civil servant could transfer from a lower class to a higher by qualifying in the open competition which he could take when he was two years older than candidates from outside. He might also receive a straight promotion. In practice about one-third of the successes in the executive open competition went to established civil servants, but few of the administrative posts were attained by examination. The report therefore recommends that established civil servants should be eligible for the reconstruction competitions provided that they are within the prescribed age limits, plus two "added years." As these men would seldom possess the educational qualifications required as a condition of entry for the reconstruction examinations, a fair number of vacancies would be allocated for a separate competition amongst them. The selection of competitors would be made by the employing departments and no officer who has received acting promotion to the assistant principal grade since the outbreak of war should be confirmed in his post unless he is selected through the limited competition.

STATEMENT BY THE GOVERNMENT

In the prefatory statement the Government connects this report on recruitment with the report on the training of civil servants which was reviewed in our June 16 issue. Although the proposals for training have still to be worked out in detail, the Government accepts them in principle. It believes that the recruitment and training reports taken together will conduce to maintaining at the highest level of efficiency a service which must, under successive Governments, undertake tasks of growing difficulty and variety in the years to come. Although the two reports cover the clerical, executive and administrative groups, which comprise the main stream of the service, the Government considers the professional, scientific and technical classes as equally important. Departments employing specialists are formulating proposals for dealing with them on the principles recommended by the Council. The arrangements for securing to the public service qualified scientists, medical officers, lawyers, economists, statisticians, engineers, architects and surveyors differ from one profession to another, but progress is being made in framing proposals for recruitment. In this connection it is gratifying to read that the Government has decided to retain in peacetime a central body of economists and statisticians such as has been set up in the Cabinet offices during the war. The need for a Central Statistics Office was discussed in an article headed "Statistics" which appeared in our issue of December 17, 1943. During the past twelve months many developments have strengthened the case for compiling and circulating promptly full information about trade and commerce. We have repeatedly contrasted the dearth of transport statistics in Great Britain with the plentiful supply of figures accessible to all enquirers in the U.S.A. and we trust that, as one of the first steps in remedying this state of affairs, the publication of railway returns will soon be resumed, of course with any modifications entailed by Government control.

THE RAILWAY POSITION

On the whole the problems which will beset the railway companies during the post-war years seem likely to be less complicated than the troubles of the Civil Service. For one thing the conditions for entry into the railway service are simpler. The great bulk of the railway clerical staff joins the service straight from school at ages between 15 and 18, after passing a plain educational test and a medical examination. After serving for a probationary period, a clerk is put through a straightforward efficiency test and is then eligible for promotion on merit

Railway Statistics 100 Years Ago

Burgess Hill, Sussex.

November 24

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Before January 1, 1913, when the Railway Companies (Accounts & Returns) Act, 1911, came into force, the statistical information presented with the half-yearly accounts by the railway companies, was not exhaustive. The 1911 Act required the railway returns to be divided into two parts, financial accounts and statistical returns. The war of 1914-18 saw suspended from publication much of the information required to be published by the Act. The informative matter provided by Part 2 of the 1911 Act was considerably in advance of that required by the Act it superseded, although the returns were then made half-yearly.

The 1840 Act for the Regulation of Railways required information in more detail than later Acts. The first part dealt with financial matters; appendices were concerned with material more like that contained in the statistical returns of the 1911 Act.

The London & Brighton Railway published statistics in greater detail than did several other railways. It also published an exhaustive analysis of the traffic over the railway between Brighton and Shoreham. There is no indication as to whether this analysis was required by the Act, or if the London & Brighton Railway provided it for purposes of its own; the contemporary returns of other railways that I have seen do not give detailed information of this kind. But in these cases the returns were those issued by the railways to the press and therefore the companies may not have considered it necessary to insert the information in the newspapers. The detailed particulars that follow are for the Shoreham branch from Brighton, but similar particulars were given for the main line.

Amount and mileage of passenger traffic on the Shoreham branch, half-year ended December 28, 1844.

Amounts. First class, fast trains, £139 11s.; mixed trains, £1,062 19s. Second class, £975 7s. 6d. Third class and cheap trains, £1,691 6s. 11d. Total, £3,869 3s. 5d.

Number of passengers. First class, fast trains, 2,791; mixed trains, 21,261. Second class, 26,017. Third class and cheap trains, 67,717. Total, 117,786.

Miles traversed. First class, fast trains, 16,746; mixed trains, 123,996½. Second class, 153,041½. Third class and cheap trains, 386,445½. Total, 680,229½.

Average number of passengers per day. First class, fast trains, 15.3; mixed trains, 116.8. Second class, 143. Third class and cheap trains, 372.1. Total, 647.2.

Average number of passengers per train. First class, fast trains, 0.9; mixed trains, 0.7. Second class, 8.2. Third class and cheap trains, 21.3. Total, 31.

Average number of miles travelled by each passenger. First class, fast trains, 6; mixed trains, 5.8. Second class, 5.9. Third class and cheap trains, 5.7. Total average, 5.8.

Equal to the undermentioned number of passengers travelling the whole distance daily. (Average number of miles travelled per passenger). First class, fast trains, 15.3; mixed trains, 112.9. Second class, 140.6. Third class and cheap trains, 353.4. Total, 622.2.

Ratio that miles travelled per passenger bear to the whole distance of 6 miles. First class, fast trains, 100; mixed trains, 96.7. Second class, 98.3. Third class and cheap trains, 95. Total, 97.

The reason for giving the statistics for the branch separately, I assume, is that the London & Brighton Railway was a provincial company; the head office at first was at Brighton Station, and the local population would be interested in the local traffic.

It will be seen that the first class mileage was for the whole distance—Brighton-Shoreham. One train had a through first class carriage from London. An advertisement stated that the branch train would not start until the through coach had been attached. This train, if it were really non-stop, was probably the through coach from London; but Bradshaw states that all trains stopped at all stations. The fast trains were not a paying business, with the average number of passengers at 0.9 per train. Most of the passengers must have travelled the whole distance; of the daily average of 647.2, the combined length of journey was equal to 622.2 travelling the whole distance of 6 miles. The intermediate stations of Hove, Portslade, Southwick, and Kingston scarcely could have paid expenses.

The half-year's accounts for the whole system for the six months, July-December, 1844, gave quite small amounts separately, which in railway balance sheets were usually lumped together, as miscellaneous; 1,658 dogs were conveyed for £187 10s. 6d., and 2,607 calves and smaller animals for £127 13s. 3d. Expenses in opposing General Railway Bill, £25; subscription to Brighton Race Cup, £25; floating breakwater at Brighton, £300; donations, etc., £9 4s. 2d.

The ordinary expenditure of running the railway is given under 13 headings, such as maintenance of way, locomotive power, superintendence, merchandise traffic charges, etc. Each of the 13 contains many items; here are a few from "Coach traffic charges"—card tickets, ticket boxes and printer, £113 15s. 8d., carriage washing, greasing and lamp cleaning, £662 9s. 6d., pumping and water supply, £47 5s. 4d.

The locomotive expenditure is shown twice. The total of one is £10,442 8s. 1d., the other £1,919 11s. 2d. The items are identical. The major sum probably relates to the Brighton establishment and possibly those of the New Cross engine shed for the smaller item. On the other hand, the larger sum may represent the main line, and the smaller the Shoreham branch.

Against each of the 13 divisions is placed a footnote. "Ratio of expenditure to ordinary traffic." This ratio for maintenance of way is £3 7s. 6d., for merchandise traffic charges £1 6s. 11d., and for maintenance of wagons 4s. 2d. The total of the 13 is £65 9s. 1d.

The ratio apparently is the proportion of working expenses to £100 of receipts.

Yours faithfully,

G. A. SEKON

Publications Received

The History of the Lebanon Valley Railroad. By Ralph S. Shay. Lebanon, Pa.: Lebanon County Historical Society. 9 in. x 6 in. 104 pp. Price \$1.—The preservation of intimate and local historical material, duly annotated, is a work which must necessarily constitute a labour of love that can scarcely hope to result in financial justification. This applies particularly in such a widespread country as the U.S.A., where enthusiasm for local details must decrease with distance from the locality. It is therefore particularly pleasant to find that there are such organisations as the Lebanon County Historical Society to deal with particular districts, and that they often deal with railway history in their Proceedings, unlike comparable bodies in Great Britain, which have a tendency to exclude events of the past century or so as unworthy of their notice. This booklet is a reprinted excerpt of a Paper read on April 17, 1942, and still bears the original folios (289-390) of the Proceedings of the Society. It is admirably produced; well annotated; contains an excellent bibliography; and is presented in interesting fashion. The railway resulted in the growth of Lebanon as a city of industrial and manufacturing

importance, and facilitated the working of the Cornwall ore mines. These benefits are shown by increase in population, value of land, wages of labour and the demand for the latter, demand for the products of the valley, and the establishment of new businesses within the limits of the County. Such a story is of more than local interest in providing a tangible example of the inestimable value of railways to a community.

Drying Paints by Radiant Heat.

A booklet which explains briefly but clearly the principles involved in the application of radiant heat to spray-painted components in stoving ovens, has been issued by Imperial Chemical Industries Limited. The term "radiant heat" in paint stoving language is often confused with the more academic term "infra-red radiation," used to emphasise the mode of propagation and position of light rays in the spectrum. Stoving by the orthodox convection-oven method often has proved a bottleneck in a promising production flow because of the time lag involved. This delay has been overcome by the application of radiant-heat methods of drying which have not only speeded up the stoving time, but have also resulted in producing better finishes. The booklet deals with heat-transfer by the radiant-

heat process, effects of heat on paint, stoving methods and the absorption of heat by painted surfaces. Useful information is also given on radiant-heating equipment, including the I.C.I. high-intensity stoving system (which uses a flux density of 100 watt per sq. in. and is far in excess of any previously used for the purpose), internal heaters and reflectors, sizes and shapes of articles to be stoved, cooling methods, and general procedure to be adopted for economical operation, efficiency and maintenance.

Drivers Handbook for Perkins P6 Type Vehicular Diesel Engines.

By H. Scott Hall. Published by F. Perkins Limited. Peterborough. 4 in. x 6½ in. 48 pp.—This handbook has been published as a supplement to the illustrated instructions manual which was prepared more for the use of engineers and mechanics. A number of pages cover lubricating-oil filters of various makes, and fuel-oil filters, with instructions on keeping them clean. The information given is sufficient for a driver to maintain his engine and chassis in good running order, and does not include repairs which should be done by the maintenance staff. This handbook is free to users of Perkins engines on application to F. Perkins Limited, Peterborough.

The Scrap Heap

A dining car steward on the Seaboard Air Line of the United States believes that he has achieved a record. A special train was run for a party of U.S. sailors from Atlanta, Georgia, to Portsmouth, Virginia, and two dining cars were assigned, but one had to be detached from the train at Athens, soon after starting, because of a defect. With a crew of four cooks and six waiters, therefore, this steward shouldered the task of serving 578 men, in a 48-seater car, with three complete meals apiece, or a total of 1,734 meals in the day.

HOUSE FLAGS FOR GOVERNMENT OFFICES

"A nice, personal, friendly touch about those talks after the one o'clock news yesterday," said the Red Queen warmly. "Captain Crookshank all about Christmas, the Post Office, and himself, and Mr. Alexander Werth all about his reactions to General de Gaulle's mission to Moscow. A nice cosy intimate sort of atmosphere, I thought."

"Does it matter?" asked Alice without much enthusiasm.

"Of course it matters," said the Red Queen heartily. "There's nothing like the personal touch for bringing reality into otherwise bare and unembellished news values."

"I can get all the reality I want," explained Alice, "just by thinking about the war and the men who are actually fighting it in this worst of all possible weathers."

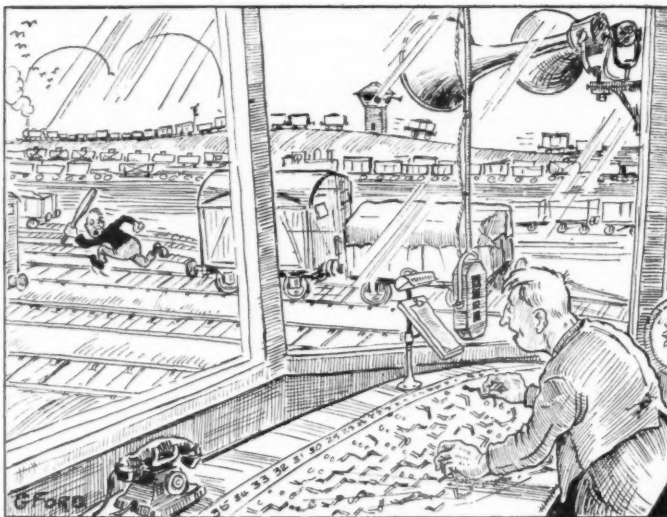
"Surely that's rather a narrow view to take?" protested the Red Queen.

"Well, it's wide enough to comprehend all England and everything that England stands for," said Alice. "And that will do to be going on with. As far as I'm concerned personal touches can stand over until peace returns."

"No," declared the Red Queen. "We want a touch of colour as well. Isn't that nice about a special flag of its own for the War Savings movement?"

"What about it?" inquired Alice. "Well," explained the Red Queen, "after the idea had been approved by the Treasury, the Home Office, and the Earl Marshal the College of Arms produced a design which was submitted to the King and approved by him; and now the King has presented the complete flag to Lord Kindersley for use by the National Savings movement. Isn't that a nice idea?"

"Very," said Alice. "And now what about a flag of their own for the Board



"Keep moving, Joe—they's oil boxes"

of Trade or the Ministry of Education?"

"Don't be silly," said the Red Queen. "This is a flag specially devised for a great national movement concerned with raising money for the country's unremitting war effort."

"Well, in that case," suggested Alice, "the income tax people certainly ought to have a flag of their own as well."

"You may be right there, child," admitted the Red Queen thoughtfully.

"What sort of a design would you suggest?"

"Elementary, my dear Watson!" said Alice blandly. "The Jolly Roger, of course, surmounted by P.A.Y.E. in the largest red letters possible.—From *The Manchester Guardian*."

THE WAGON THAT NO ONE MISSED

The loss from a freight train of a tank wagon which none of the train staff missed was a remarkable feature of a recent accident on the Pennsylvania Railroad of the U.S.A. At two o'clock in the morning, near Fairplay, West Virginia, this bogie wagon of an eastbound

train jumped the track, became uncoupled at both ends, and fell into the neighbouring Cross Creek. By the severance of the brake hosepipe, the rear portion of the train, none of which had been derailed, came to a stand; the front portion, also intact and all on the rails, rolled on for about 2 miles before stopping. The train crew then decided to back, in order to retrieve the rear end of the train; having found it, they coupled up and proceeded, not realising that they had lost one of the wagons. It was first spotted by the fireman of a westbound light engine.

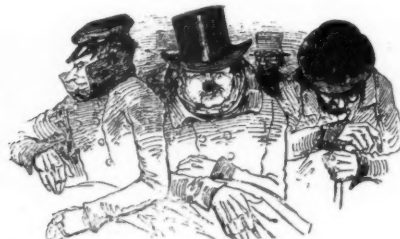
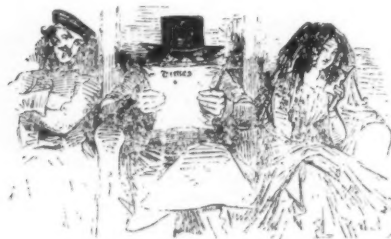
TAILPIECE

(Extra trains will not run this Christmas)

The sixth war Christmas, like the rest,
The slogan "Stay at Home" is best.
Of trains there'll be no overplus
To meet a Yuletide exodus,
And all who can should still maintain
This once again
The status quo and not complain.

The sixth war Christmas finds us bright
With visions of the end in sight,
But still by rail, road, air we send
The men, the guns to speed the end.
So be content in that good cause,
This Yuletide pause,
To share a sledge with Santa Claus.

E. C.



"Although comfortable enough, there is little sociability in a first-class carriage on a railway; everybody seems to have an idea that he is the only one who is really entitled, by payment and position, to a seat therein, and so is afraid of compromising his dignity by speaking. . . . Your regular second-class travellers are deep fellows. They come early to get a back seat. . . . They watch the weather-cocks, too, and if it be warm weather are chatty. . . . But in cold weather the second-class travellers talk but little. The rattling pig-pens upon wheels, misnamed third-class carriages (before the late alterations), were despicable affairs, with the wonderful property of always meeting the rain in whatever quarter the wind might be blowing. They were a species of horizontal shower-bath, from whose searching power there was no escape."

From *The Illustrated London News* of December 7, 1844

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

Railwaymen in the Army

Brigadier C. M. Hoffe, General Manager of the South African Railways & Harbours, addressed the Germiston Rotary Club recently on the subject of his visit to the Middle East, when he covered 15,000 miles in 50 days, and saw railwaymen under active service conditions. He said that there were 9,000 railwaymen in the Army. Some had gone as far afield as the Turkish border. Seven hundred men had been captured at Tobruk, but some of those were coming back to the Union from Switzerland. He added that the railwaymen had a wonderful reputation for their efficiency right through Syria, Palestine and Lebanon.

UNITED STATES

Advertising in Grand Central Terminal

In the main concourse and lower level of the Grand Central Terminal in New York, advertising display signs of a new type have been installed, each about 9 ft. wide and 7 ft. high. The signs are sculptured in heavy relief, to a depth of 12 in., and with suitable illumination an arresting three-dimensional effect is obtained. Some of the designs are animated to some extent by changing-light effects, but care has been taken to avoid the use of any gaudy or quick-flashing effects. Illuminated bas-relief advertising of a somewhat similar type has been installed for some time in the main-line booking-hall at Kings Cross, London, L.N.E.R.

The Grand Central is one of the first of the great terminal stations in the United States to permit outside advertising; but the New York Central System and the New York, New Haven & Hartford Railroad, the trains of which use the station, always have insisted that all advertising signs must be approved by the station architects, so that a sufficiently high standard may be maintained.

Miscellaneous Improvement Schemes

The Pennsylvania Railroad plans to improve and enlarge its extensive Sunnyside passenger carriage yards on Long Island. Additional tracks will be laid; and repair facilities, at present sufficient for about 6,200 vehicles a year, are to be extended.

Improvements to locomotive facilities include provision of a new diesel maintenance shop for the Northern Pacific Railway at Auburn, near Seattle, at a cost of \$400,000. New diesel maintenance and repair shops have been authorised by the Southern Railway System at Alexandria, Virginia, at an estimated cost of \$298,000, and by the Atchison, Topeka & Santa Fe Railway System at Barstow, California. The Chicago, Rock Island & Pacific Railway has placed a contract for a new locomotive depot at Cedar Rapids, Iowa, with twelve 115-ft. stalls, to cost \$110,000.

Station Reconstructions

Station-improvement schemes include one for a new passenger station for the Northern Pacific Railway at Billings, Montana, with concrete platforms, rearrangement of tracks, and floodlighting, to cost in all \$170,000; and reconstruction by the Louisville & Nashville Railroad of its passenger station at Milan, Tennessee, at a cost of some \$56,000. A new passenger station at Helper, Utah, will form part of an extensive Denver & Rio Grande Western Railroad scheme at that place, to include additional

tracks, coaling and watering facilities, a new water-treatment plant, and extension of the yard control system. The same company is improving its marshalling-yard facilities at Roper, Utah, outside Salt Lake City.

BRAZIL

Joint Station for Nictheroy

The building of a new terminal station at Nictheroy, capable of accommodating the service of the Leopoldina Railway and the Maricá Railway together, has been under consideration since 1942. It is now the intention of the State of Rio de Janeiro to build the joint station at a point somewhat removed from the existing station at the crossing of the Avenida Jansen de Mello and the Rua Benjamin Constant, and to convert the latter station building into a customs house and offices for the port authorities.

CHILE

Locally-Built Steel Passenger Stock

The first four steel third-class passenger railway carriages built in the Valparaíso shops of the Chilean State Railways were delivered in September.

Proposed Electrification

The State Railways Administration is proposing to proceed with the electrification of the line between Santiago and the southern city of Talca. In *The Railway Gazette* of May 5 last it was recorded that tenders had been sought for the electrical equipment of this line and of the Santiago-Cartagena and Santiago-Talagante.

BOLIVIA

Corumba-Santa Cruz Railway

Of the railway which is under construction between Corumba (just over the Brazilian border) and Santa Cruz (to form part of the transcontinental railway route from Santos, Brazil, to Arica, Chile), some 170 km. (106 miles) of track are now laid and opened for traffic westward from Corumba. The commission in charge of the work has at its disposal some 220 goods wagons, 12 locomotives, two inspection coaches, two passenger coaches and 20 rail motor cars. Further progress is being hindered by the shortage of rails and other equipment. The transcontinental route may be seen from the maps published in *The Railway Gazette* of December 24, 1943, and of January 7, 1944.

CEYLON

Railway Clerical Service

About forty officers drawing the maximum salary in class II of the Railway Clerical Service are to be promoted to class I; and a proportionate number of officers at the top of class III are to be promoted to class II (see also *The Railway Gazette* of September 15 last).

Post-War Transport Proposals

The unification of the control of all internal transport in Ceylon by the placing of railway and other forms of transport under the authority of one minister, the creation of a transport board for all commercial transport, and the inauguration of a transport system in Colombo operated by a single undertaking of large resources are recommended by Mr. S. W. Nelson, Director of Transport, in a memorandum on the post-war development of transport in the island. He states that these recommenda-

tions represent the minimum requirements for the effective control and co-operation of Ceylon's internal transport.

Mr. Nelson recommends the overhauling and modernising of the road-traffic laws so as to provide for adequate powers of control and enforcement, with a view to the improvement of such road services as are required and the prevention of wasteful and uneconomic competition between the two main forms of transport. He also suggests that, either by a transfer of functions or by the creation of a separate ministry, responsibility to the State Council for all forms of internal transport, and for the construction of roads, should rest with one minister. At present, the railway is under the Minister of Communications & Works, and motor transport under the Minister of Local Administration.

In respect of the creation of a single transport undertaking, with large resources, for Colombo, Mr. Nelson proposes that this should comprise the tram and bus services and possibly include the suburban railway services. The formation of a transport trust might well be considered, he states, the ground having been prepared already by the amalgamation of individual bus owners into limited-liability companies. No more licences for new city or suburban bus services should be granted to individuals or small groups.

Proposed Transport Board

In connection with the creation of a board for all commercial transport, Mr. Nelson states that this should consist of the General Manager of Railways; the Chief Registrar of Vehicles, who would represent road interests; and a whole-time paid chairman who should be an officer of high standing. Although the management of the railway would continue to be in the hands of the General Manager of Railways, the board would advise the minister responsible for transport on all questions of major policy affecting internal transport. It would deal, for instance, with such questions as railway rates; railway operation of road collection-and-delivery services either directly or by contract; development of suburban services; substitution of road for rail services; closing of stations; provision of railway halts or stations; and use of pieces of railway property as bus termini. It would deal also with the organisation and development of the island's inland waterways and coastwise shipping, with a view to their use to the best advantage in relation to rail and road services.

The board would determine all applications for licences to operate bus or lorry services, and would be responsible for the enforcement of licence conditions and generally for the smooth functioning of transport. It would decide on applications purely on transport principles and in accordance with a pre-determined policy approved by the responsible minister.

Mr. Nelson pleads for a new outlook on the problem. Transport must be recognised by the authorities as a public utility to be brought up to the highest standard for the service of the community, and not as an opportunity for any individual who can obtain enough money to pay the deposit on a new or second-hand motor vehicle. Railway and road transport should not be considered antagonistic, states Mr. Nelson, but as complementary. Each has certain advantages over the other; and the aim must be so to plan the island's transport system that the best of both is made available for the community, for example, advantage should be taken of the railway's capacity for dealing with long-distance traffic in bulk, and of the road's greater flexibility and its suitability for local traffic.

The Relationship Between Smokebox and Boiler Proportions*

Some basic considerations developed from first principles, for application to the design of smokeboxes, enumerated by Mr. D. W. Sanford, B.A., M.I.Loco.E.

THIS is an attempt to find a rational relationship between the proportions of the chimney and blast pipe on the one hand, and the boiler proportions on the other. The two functions of the blast pipe and chimney can best be investigated separately. These are:—

(i) To eject to the atmosphere all the products of combustion which have to be produced to develop a certain amount of power.

(ii) To create sufficient vacuum in the smokebox to draw the necessary amount of gas through the grate and tubes.

Suppose that each 1 lb. of coal burnt produces α lb. of steam, and that each 1 lb. of steam occupies V_s cu. ft. at the temperature at which it is discharged from the blast pipe orifice. Suppose also that each 1 lb. of coal burnt produces β lb. of gas and that this occupies V_g cu. ft. at the temperature at which this leaves the tubes. Let A_b be the area of the blast-pipe orifice in sq. ft. and A_c the area of the chimney choke. Then, assuming that no momentum is lost, from first principles the following relationship is developed:—

$$\frac{A_c}{A_b} = \frac{\alpha + \beta}{\alpha} \left[1 + \frac{\beta V_g}{\alpha V_s} \right]$$

Taking as typical values $\alpha = 7.5$, $\beta = 15.8$, $V_s = 28$, $V_g = 26$,

$$\frac{A_c}{A_b} = \frac{23.3}{7.5} \left[1 + \frac{15.8}{7.5} \times \frac{26}{28} \right] = 9.18.$$

Hence, chimney dia. = $\sqrt{9.18} = 3.03$ times blast-pipe dia., which agrees pretty closely with actual practice. It will be noted that if the gas produced per 1 lb. of coal is increased, as by admitting more excess air, the ratio A_c/A_b will be increased.

If the smokebox vacuum is neglected, it is obviously an advantage to make the chimney diameter as large as possible, as this allows the blast pipe to be correspondingly large, resulting in a reduced back-pressure. The larger the chimney, the less is the work thrown away as kinetic energy in the escaping gases and steam. There are practical difficulties in a large chimney area, as it is necessary to preserve a certain geometrical relationship between the diameter of the chimney and the vertical distance between the top of the blast pipe and the top of the chimney, and obviously the chimney top must be within the loading gauge, and the blast pipe top must be a reasonable height above the floor of the smokebox to prevent it being buried in ashes. A very large chimney area is attainable, without incurring these difficulties, by the use of a double or treble chimney and blast pipe.

The upper limit to the chimney area is governed solely by the necessity for producing an adequate vacuum in the smokebox, as the maximum vacuum that can be produced depends on the velocity of the mixture passing up the chimney. As the gases pass up the chimney from the lower pressure in the smokebox to the higher pressure of the atmosphere, they are compressed adiabatically, and the velocity is converted to pressure. For the ideal case

of frictionless flow and uniform velocity v_m , the relationship is given by:—

$$v_m^2 = \frac{2gn}{n-1} (D^{-1/n} - D^{-1}) P_2 V_1.$$

Here v_m is the velocity of mixture at base of chimney; $n = 1.5$; $g = 32.2$ ft. per sec. per sec.; and $D = P_2/P_1$, where P_2 and P_1 are respectively the atmospheric and the smokebox pressures in lb. per sq. ft. absolute, and V_1 is the specific volume of the mixture at pressure P_1 .

Below is a graph obtained by the use of the above formula with V_1 at a figure

In the appendix to the paper is given a method for determining the "resistance" of a boiler. If R be the resistance, S the smokebox vacuum, and Q the number of cubic feet of gas per second,

$$\text{Then } \sqrt{S} = QR, \text{ or } S = Q^2 R^2$$

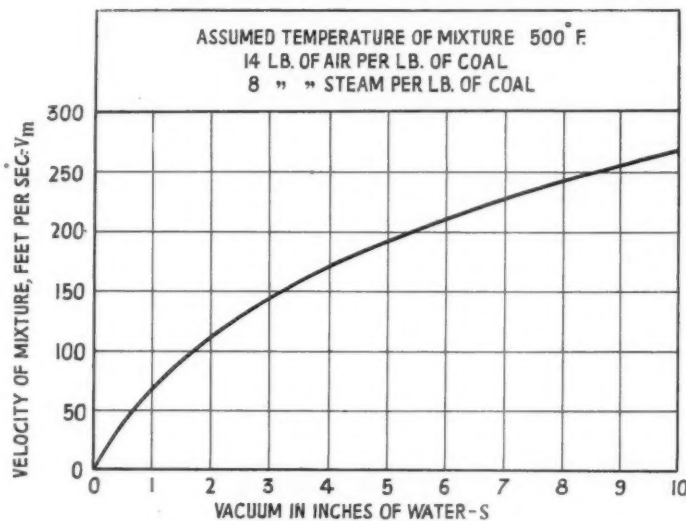
This is the equation for the vacuum obtainable. As it is desired to use as large a chimney as possible, it is also desirable to reduce S to the minimum acceptable figure. But S must not be less than $Q^2 R^2$ and the limiting condition is that

$$K \frac{Q^2}{A_c^2} = Q^2 R^2$$

Hence

$$A_c = \frac{\sqrt{K}}{R}$$

This leads to the interesting fact that the area of the chimney should be inversely proportional to the resistance of the boiler, or



Theoretical vacuum for any given velocity

corresponding to a temperature of 500° F. Unfortunately, this curve is of no direct use, as it assumes uniform velocity. In practice, the velocity is considerably greater at the centre of the jet than it is at the sides; there is also the effect of friction and eddies, and the blast is pulsating and not steady. Hence, the velocity needed to produce the required vacuum exceeds that shown in the ideal curve. Any better use of the high velocity in the centre of the jet improves the effect; therefore double chimneys, "K.C." blast pipes, or the Adams vortex to improve the efficiency by yielding a higher vacuum for mean velocity are to be commended.

Now if the curve in the graph is examined, and if the smokebox vacuum is denoted by S , it is seen that the curve is a close approximation to that given by $S = \lambda v_m^2$, where λ is a constant. If Q be the number of cubic feet of products of combustion which have to be abstracted

per second, it can be shown that $S = K \frac{Q^2}{A_c^2}$

where K is a constant, the value of which can be estimated from first principles. This is the equation for the vacuum obtainable.

Having got an expression for the vacuum obtainable, an expression is needed for the vacuum required to pull Q cu. ft. of gas through the grate and tubes per second.

proportioned to the resistance of the boiler, or proportional to the "steaming capacity"—a condition which has not been observed generally in the past. Many large modern engines have been fitted with chimneys no larger than those of quite small engines with boilers of only half the capacity or double the resistance. Recently, however, there has been a move in the right direction by fitting double chimneys or otherwise increasing the chimney area.

The more efficient the engine is made the more important is it to improve the efficiency of the blast arrangement. Conversely, the more efficient the blast arrangement the larger can be the area of the chimney and the dependent blast pipe orifice, which reduces the back pressure and thus still further improves the cylinder efficiency.

It should be possible to determine whether an engine has been fitted with too large a chimney by the following method: Let a U-tube be fitted to the smokebox to indicate the vacuum therein. Now the vacuum in the smokebox will be given by one or the other of equations for S , whichever gives the lower value. If the engine is kept working at the same speed and cut-off (that is, if Q is kept constant), and if the resistance of the boiler is increased by shutting the fire-door and almost entirely closing the damper, and if this results in an increase in the

(Continued on page 631)

* Abstract of a paper read before the Institution of Locomotive Engineers on November 30, 1944

Automatic Signalling, Swedish State Railways

Automatic signalling is being extended. The signal aspects present interesting features

A GENERAL article describing signalling practice on the Swedish State Railways appeared in *The Railway Gazette* for November 1, 1940. The important power-signalling installation at Gothenburg Station was described in our issue for September 1, 1933, and accounts of some of the work on the private railways have also appeared in our columns.

Practice may be said to be fairly uniform throughout Sweden, although the simpler stations met with on some of the private lines do not call for the refinements considered necessary on the main State routes. The wide extension of electric traction on the single-phase system and the ready availability of electric power have given a great impetus to the adoption of light signals. The severe conditions encountered in winter render the regulation and maintenance of mechanical transmissions, notwithstanding that the double-wire system is invariably used, a matter of some difficulty, and consequently the change to power operation is being made wherever possible.

Large numbers of distant signals have been changed to colour lights, using in many cases acetylene light and a movable internal spectacle. Acetylene has long been used in Sweden for the mechanical signals, and for train tail and side lamps, and other purposes.

When the adoption of light signals was first considered the question of signal aspects generally was brought under review, as well as the advisability of following British and American practice in the matter of interlocked shunt signals. It was decided to adopt the colour-light signal for running movements and the position-light dwarf signal for shunt movements, and this principle was applied from about 1925. Subsequently the use of the position-light signal was extended to cover starting signals at the outlet of both running roads and sidings in stations; only the home and advanced starting signals were colour-lights. Later still, when the practice of signalling running lines between stations for wrong-line working became regular practice, the position-light signal was adopted for wrong-line movements. (Left-hand running is standard in Sweden).

A recent installation, presenting practically all the features now met with in this class of work in Sweden is that between Hallsberg and Örebro, described recently in the *Nordisk Järnbantidskrift* by Herr C. Viksten, Station Inspector at Mjölby, and the accompanying diagram shows the principal features of the work, using symbols readily understood by readers in this country.

The total length of line equipped is 22.3 km. (about 14 miles) and extends from Hallsberg to Örebro South, in which is the power interlocking area worked from Örebro Central. The maximum authorised speed is 90 km.p.h. (56 m.p.h.) and the signals are arranged to allow of a 4- to 5-min. headway. The block sections vary between 2.6 and 4 km. (2,843 and 4,374 yd.). The station limits of the two stations met with, Kumla and Mosås, are 1,400 m. (about 1,530 yd.) long. There is a siding in section at Säbylund and three halts, Sannahed, Närke-Marieberg and Adolfsberg. The entire section of route is track circuited. The use of

single-phase traction makes d.c. track circuiting possible, provided certain precautions are taken.

The signal aspects employed in the installation under review, which are typical of those being used in all new work in Sweden, are as follow:—

Ordinary Automatic Signals

Stop Red light.
Caution: next signal Flashing green light.
at danger
Proceed Steady green light.
(The advanced starting signal at a station also shows these aspects).

Station Home Signals

Stop Red light.
Proceed on direct route Steady green light over and stop in station flashing green light.
Run through on direct route Steady green light over flashing white light.
Proceed on diverging route Two or three steady green lights, according to route.

Distant Signals

Caution: next signal Flashing green light.
at stop
Proceed: next signal Flashing white light.
is off

Ground Signals

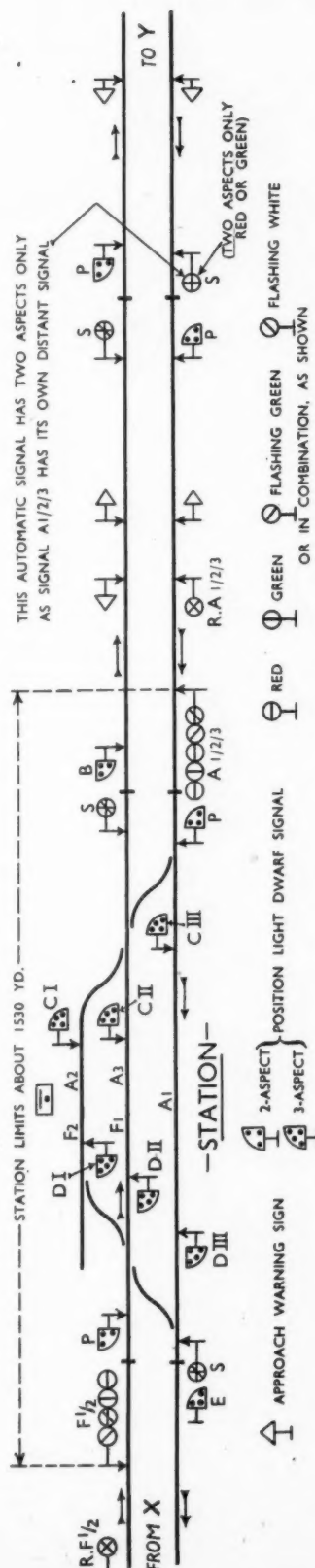
Stop Two white lights, horizontally.
Proceed Two white lights, vertically.

In the case of outlet starting signals a third aspect is shown thus:—
Proceed; advanced starting or wrong line section signal is at danger. (Also used generally throughout large station yards).

The complete signalling of wrong-line movements, now standard practice in Sweden, operated in connection with "direction levers" and time-element relays at the stations, is of particular interest, and is considered a valuable facility, affording much saving of time when such movements have to be used.

The arrangements set out on the diagram will probably be clear, from the explanations given above, but there are one or two features deserving mention. It will be noticed that one of the ordinary automatic signals, all marked S on the diagram, for trains approaching from Y, shows red and steady green only. This is because the home signal, A ^{1/2/3}, of the station ahead, has its own distant signal. As a rule the intermediate automatic signals have no separate distant signal; the signal in rear, in spite of the comparatively long block sections, is used to give a flashing green approach indication when "stop" is being shown. At braking distance in rear there is a triangular warning sign, studded with reflector buttons (these signs are also provided in rear of the wrong-line signals). Where, however, local conditions make it advisable to instal a special distant signal in rear of an automatic signal there is no warning sign, and the signal in rear shows red and steady green only. On some sections where higher speeds are allowed the distant signal for a station has a steady yellow light which appears below the flashing white when the home signal in advance indicates that a diverging route is set up. This is not shown on the diagram.

The marking of the station home signal (Continued on page 624)



Typical layout of automatic and controlled signalling, Swedish State Railways

How the Association of American Railroads Works

(By a correspondent)

THE United States Senate does a great deal of its business through committees, which are entrusted with enquiries into specific subjects. One important committee deals with military affairs. It is a somewhat unwieldy body consisting of 17 members under the chairmanship of Senator R. R. Reynolds, North Carolina, and has appointed a sub-committee of 8 members, with Senator H. M. Kilgore, West Virginia, as Chairman, to study how the national resources can be mobilised to the best advantage.

In March last Mr. Kilgore advised Mr. J. J. Pelley, President, Association of American Railroads, that his sub-committee was profoundly interested in the mobilisation for war of the scientific and technological resources of the States and in their potentialities for full development in the post-war period: it believed that there were tremendous opportunities for progress in the field of railway technology and it invited the association to discuss the factors impeding progress in the past, current possibilities, and constructive suggestions for the future.

In response to this expansive request, the A.A.R. submitted a statement which filled 142 closely printed pages and on August 17 Mr. R. V. Fletcher, one of its Vice-Presidents, appeared before the sub-committee to open the case for the railways which had been criticised in certain quarters for being deficient in enterprise and backward in research. Mr. Fletcher told the sub-committee that he was a lawyer with some 45 years' experience at the Bar. For about 22 years he had been connected with the Illinois Central at Chicago and for the past 11 years had been the responsible head of the law department of the A.A.R. He then proceeded to explain the history, organisation, and functioning of that association, with special reference to its relation to the member railways and its obligations in the matter of research. At a time when research and planning are so prominently in the forefront in Great Britain, a summary of Mr. Fletcher's remarks is given below in the hope that it may prove useful to many readers.

The A.A.R. came into being in October, 1934. It is not incorporated, or in other words, it is a voluntary body. Practically all the Class 1 railways of the United States, Canada, and Mexico are members. These railways operate 96 per cent. of the mileage of North America and handle about 99 per cent. of the traffic moving by rail. Each member railway has signified assent to the Plan of Organisation of the A.A.R. which commits the general supervision of its affairs to a board of 18 directors selected annually from the chief executives of the member railways—6 from Eastern, 7 from Western and 4 from Southern territory—with the President as Chairman. The board meets in regular session on the final Friday of each month, but a small executive committee of directors selected by the board can act with full powers at any time when an emergency arises. The board elects the officers of the A.A.R., who are the President; five Vice-Presidents, one of whom is General Counsel; Associate General Counsel; General Solicitor; Secretary-Treasurer. Each Vice-President is in charge of one of the five departments established by the Association, to wit:—

I.—Law, dealing with questions of

legislation, governmental action and policy.

II.—Operations and maintenance, dealing with wagon supply, operating methods and equipment, signalling, telegraphs and telephones, maintenance and construction engineering, mechanical engineering, purchases and stores.*

III.—Traffic, dealing with passenger and freight commercial matters.

IV.—Finance, accounting, taxation and valuation, handling all phases of these activities.

V.—Planning & Research, conducting the analysis and study of transport operations with special attention to improvements in present methods and practices.

After explaining the general set-up of the A.A.R., Mr. Fletcher emphasised that its powers were strictly limited—in fact any authority which it exerted was by reason of an express grant of power, binding only on the railways that assented. "It cannot make a rate," he continued; "it cannot make an order; it cannot prevent a railroad from adopting and following any operating practice which it may prefer. The association is in the nature of a general staff . . . It furnishes a convenient and, indeed, indispensable medium for the orderly and co-operative consideration of railroad problems of national significance. It depends in large degree for its usefulness upon the confidence which the members have in the intelligence, zeal and honesty of its officers."

One important piece of practical railway work performed by the A.A.R. is the control of freight rolling stock. By far the greatest number of the association's staff are in the Car Service Division, which has done much to further America's war effort by keeping the supply of wagons fluid. An account of its functions was given in an editorial article on "Wagon Distribution in the U.S.A.," published in *The Railway Gazette* of November 24. Another most efficient branch of the organisation is the Bureau of Railway Economics, which collects, analyses and disseminates statistical and other information bearing on railway problems. In theory the bureau is absorbed in the Planning & Research Department, but any study prepared by its Director, Dr. Julius H. Parmelee, may safely be considered as authoritative, and he invariably represents the association at hearings where general statistical statements are presented.

Mr. Fletcher enlarged on the type of practical research which the railway companies staff performed in the ordinary course of their duties. He considered the work done by railwaymen in watching the behaviour of materials under stress, the working out of methods of construction and operation, or the reaction of the human element to policies and practices, as more productive in many cases than laboratory experiments. Many railways, however, have extensive laboratories where experimental studies are constantly going forward. The A.A.R. also carries on research through some 200 technical committees. The work is supervised by competent railway officers and provides full-time employment for 200 members of the association's staff. In

* The work of the seven divisions forming the Operations & Maintenance Department was described in our December 1, 1939, issue (pages 695 and 701).

addition to this current systematic research, the board of directors decided in May, 1942, that a special enquiry was desirable into probable post-war conditions and post-war policies. The board authorised an expenditure of \$300,000 on the investigation and requested Mr. Fletcher to take the matter in hand. The machinery which he devised for the purpose was described in an article which appeared in our September 8 issue under the title "American Railway Research Arrangements."

Mr. Fletcher hopes that the work of this special post-war committee will be brought to a conclusion by the end of 1945. He is determined that its findings will not consist of vague and glittering generalities, but will be clear, concrete, definite and practical. Mr. Fletcher informed the Senatorial representatives that the work of the post-war committee ultimately might be taken over by a new department of the association, devoted exclusively to research, economic as well as technical. The railways, he added, were alert to their obligations and their opportunities. They had served the nation superbly in time of war. They would be equally efficient in time of peace and, to that end, no research activity would be overlooked, if there was any rational promise of improvement.

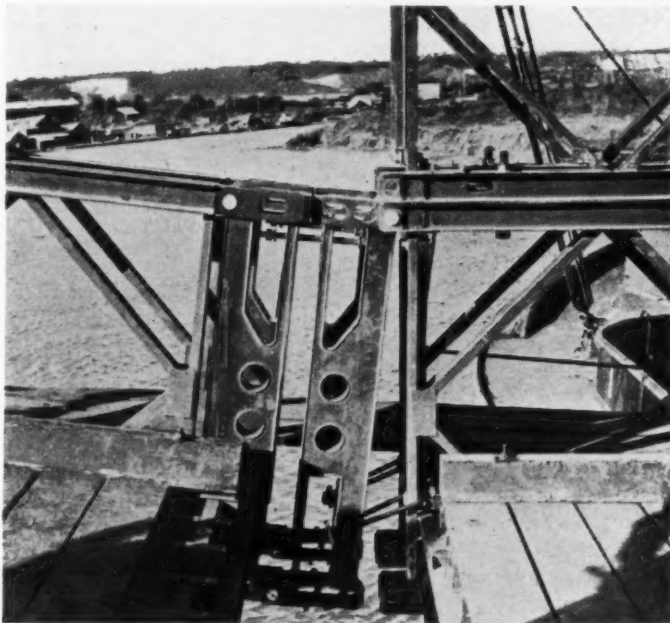
Automatic Signalling, Swedish State Railways—(Concluded from page 623)

nals, such as $F \frac{1}{2}$, $A \frac{1}{2}$, indicates which proceed aspects the signal can show. The routes covered by them are marked on the plan. Thus aspect A^3 means signal A showing three steady green lights, which is for a train to run in over the facing crossover to the opposite line in the station. The bottom lens unit used in this aspect is also made use of as a flashing caution aspect, when aspect A^1 appears (one steady green light), the two together meaning that the direct route is set but that departure from the station is still prohibited. Special locking with time control is fitted to control the Säbylund siding and the existing mechanical crank-handle type lever frames, still used for working the points at the stations by double wires, are fitted with illuminated diagrams. Telephones are placed near all home, advanced starting and intermediate signals. If stopped at, such train crews after waiting 2 minutes, must telephone to the station in advance and ask for instructions, but if the telephone is out of order they must proceed under the caution rule. Three level crossings between stations have automatic light or audible alarm signals and three others at Kumla have the usual Continental type lifting barriers.

LIGHTALLOYS LIMITED).—The Chairman's speech read at the 18th ordinary general meeting stated that the year under review had been an active one resulting in an increase both in turnover and trading profit. The profit control or rebate agreement with the Minister of Aircraft Production had been in operation during the whole of the year, and its effect had again been to reduce the profits of the company to a figure below its standard profit, thus giving rise to a further claim for recovery of a small amount of excess profits tax. This agreement would expire, at the latest on December 31 next. The new form of the balance sheet was calculated to disclose at a glance the salient features required to enable the financial position of the company to be assessed.

The Bailey Military Bridge

A general description of this successful type of bridge as used by the Allies



End-posts and pin joints between spans during construction

FEW items of military equipment have earned more unstinted praise from our commanders in the field than the Bailey bridge. Though it is not yet permissible to describe all its parts in detail, the following is a general description of them, of the bridge as a whole, and of its erection and uses.

Its main girders are built up of light pre-welded standard and interchangeable pony-truss panels, each 10 ft. long and capable of being connected end-on to another similar panel, with only one steel pin required for each joint. A span of moderate length, having its main girders composed of two single rows of these panels, will carry loads up to 20 tons. In each completed 10-ft. length of such a bridge there are only 17 parts, and 9 other parts are used to make the foundation. The heaviest of these parts can be handled by six men. There are two cross girders to each 10-ft. length, which rest on the bottom chords of the panels and are secured to them by simple clamps. Holes are cut in these cross girders to facilitate handling with carrying bars. Lateral stability of the main girders is provided by raker struts fixed diagonally from the top chords of the panels to the projecting ends of the cross girders. The stringer floor members are also in the form of pre-welded panels, each with three stringer members and are easily carried.

This, however, is only the simplest form of the Bailey bridge, and, if heavier loads have to be carried or longer spans are required, additional rows of truss panels can be used in duplicate, or even in triplicate, side by side, to form much more substantial main girders. When used in duplicate the two rows are spaced slightly apart and secured with diagonal bracing. In triplicate, the third row of truss panels is fixed outside the duplicated panels and closely braced to the outer rows.

two rows side by side, "Double-single"; two tiers of two rows, "Double-double"; three tiers of three rows, "Triple-triple."

A "triple-double" bridge may be up to 170 ft. in length, and a "triple-triple" up to 300 ft. In multiple-tier spans, the tiers do not all necessarily extend the full length of the spans. One bridge built by the Army in Italy, for instance, has two tiers throughout the length of the span, but the third or top tier has a length equal to only about half the span and is used to reinforce the centre portion of the span where the bending moment is greatest. Vehicles weighing up to 70 tons are carried by this type of bridge.

The roadway is normally (but not necessarily) carried on the lower chords of the bottom tier, as a through span. With a three-tier span, lateral stability can be secured by the provision of wind bracing between the tops of the main girders, as there is sufficient headway.

The spans so far described are normally erected on rigid abutments or piers, but, if pontoons can be used to support intermediate points, lighter continuous (or semi-continuous) spans can be substituted. Actually, each Bailey span between two pontoons is pin-connected to the adjacent span at bottom chord level only, and special posts are used at the ends of the spans; the joints remain disconnected at the top. When the live load submerges the pontoon below a certain point, the ends of the top chords come together and form a continuous span, tending to relieve the pontoon of further additional loading, and to distribute it over several pontoons.

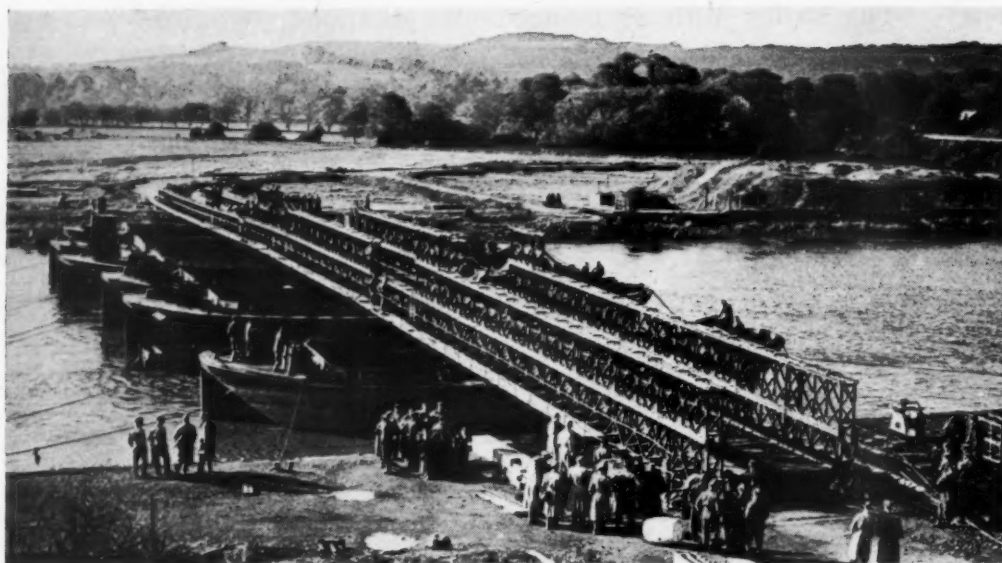
Bailey bridges are generally erected in the first instances as "single-single" units, even if subsequently built up as



A "triple-triple" span showing arrangement of panel trusses and overhead wind bracing. This 300-ft. span was completed over the Trigo river in Italy in 36 hr.

If still heavier loads or longer spans are required, additional rows of trusses can be superimposed on the original rows, so as to form two or even three tiers of truss panels. The trusses arranged one above another are secured together with bolts. These various combinations of trusses for each type of bridge are described as follow:—Single rows, "Single-single";

multiple-truss spans. The panels are pinned together on rollers, so as to form long girders, which can be pushed out across the gap to be spanned. The leading panels form a cantilever "launching nose," and, to counteract its tendency to sag, distance pieces or links can be inserted temporarily between the lower chord knuckle joints and so lift the nose.



A pontoon-supported bridge consisting of two "double-double" and a series of "double-single" spans (possibly being built up to "double-double") under construction

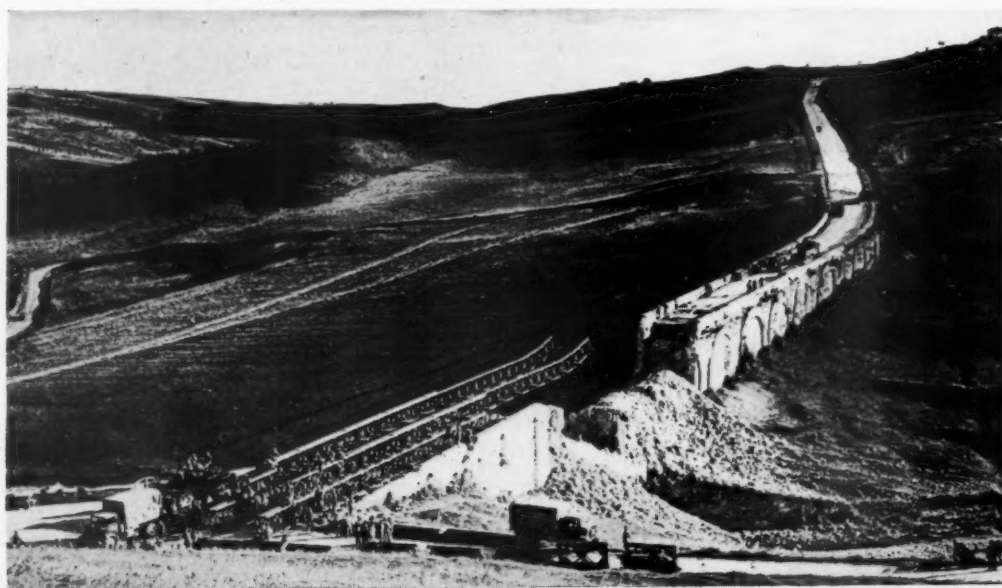
Counterweight sections are simultaneously added behind the launching rollers so as to balance the weight of the launching nose. When the nose reaches the far side of the gap it is received on other rollers sufficiently light in weight to have been carried across by men straddling the girders. The counterweight sections can then be detached and used to form part of the finished bridge. Each completed span is provided with adequate bearing plates under the usual type of end bearing.

The Bailey bridge was designed by, and produced and perfected under the supervision of, Mr. Donald C. Bailey, of the Ministry of Supply; the first example of it was tested experimentally in 1940. It has since been used with conspicuous success

in the North African, Sicilian, and Italian campaigns, and more recently in north-western Europe. In Italy alone, two of these bridges were being built on an average every day, towards the end of 1943.

Perhaps the highest tribute paid to it is by the American Forces, who have adopted it as standard for their field bridging. The component parts, though fabricated in both Great Britain and the United States, are interchangeable. In addition to the rapidity with which it can be erected, it has great advantages, notably the ease with which it can be transported in lorries and man-handled. Though there may as yet be no official evidence available in support of this surmise, it seems reasonably certain that this

type of bridge played an important part in the phenomenally rapid advance of the Allies from Normandy to Belgium, for its uses are manifold. It can be used as an entirely new bridge, either low-level with or without pontoons, or high-level with standard military-type trestle piers. Or it can be launched across the gap formed by a "blown" arch, or between the piers of a demolished girder bridge, the size of span varying within reason and the overall length of bridge being almost unlimited. A 300-ft. gap was spanned within a period of 36 hr., so that even such formidable bridging requirements do not hold up the advance of an army for any great length of time, and smaller spans are very quickly erected.



A Bailey bridge being launched. Note the upturned end of the launching nose and counterweight trusses

RAILWAY NEWS SECTION

PERSONAL

The Treasury announces that Lord Swinton has intimated that, in view of his appointment as Minister for Civil Aviation, he feels unable to continue as Chairman of the United Kingdom Commercial Corporation Limited and that Sir Francis Joseph, who has been Acting Chairman since June, 1942, has accepted the Chairmanship. Sir Francis Joseph is a Director of the London Midland & Scottish Railway Company.

The Minister of War Transport has appointed Mr. W. G. Hynard to be his representative in Canada, in succession to Mr. W. Guy Ropner, who is returning to the United Kingdom.

Sir Llewellyn T. G. Soulsby has been elected a Director of Stothert & Pitt Limited. He is Managing Director of Mountstuart Dry Docks Limited.

Mr. A. S. Woodgate has been appointed Chief Engineer to the North Western Road Car Co. Ltd. of Stockport, in succession to Mr. C. J. Brown, who has left to take up a similar appointment with the Western and Southern National Omnibus Companies at Exeter. Mr. Woodgate is at present Engineer to the East Midland Motor Services Limited.

The undermentioned have been appointed Special Directors of Dorman, Long & Co. Ltd.:—Messrs. D. R. Brooks, Chief Agent in charge of the company's Durham collieries; R. A. Hacking, Controller of Production; E. T. Judge, Chief Technical Engineer; A. MacLeod, Commercial Manager; and J. A. Millar, Treasurer.

INDIAN RAILWAY STAFF CHANGES

Mr. R. W. F. Butterfield, C.I.E., Financial Adviser & Chief Accounts Officer, B.B.C.I.R., was granted 21 months' leave, preparatory to retirement, as from April 1.

Mr. R. T. Collins has been confirmed as Deputy Chief Accounts Officer, B.B.C.I.R.

Mr. S. D. Bamjee has been appointed to officiate as Chief Engineer, E.I.R.

Mr. I. H. Lightowler has been appointed to officiate as Controller of Stores, E.I.R.

Mr. A. O. Evans, Chief Commercial Manager, E.I.R., was granted six months' leave, preparatory to retirement, as from May 25.

Mr. W. G. Latham has been appointed to officiate as Senior Deputy General Manager, M.S.M.R.

Major P. A. F. Cory has been appointed to officiate as Junior Deputy General Manager, M.S.M.R.

Flight-Lieutenant H. L. W. Stevens, who had been officiating as Controller of Stores, M.S.M.R., has been confirmed permanently in that appointment.

Mr. R. W. R. Rankin has been appointed to officiate as Deputy Chief Engineer, M.S.M.R.

Mr. G. E. Cuffe, General Manager of the Bengal & Assam Railway, is returning to India shortly after a period of leave in England. The Bengal & Assam system was formed on January 1, 1942, when the Assam-Bengal Railway was acquired by the State and combined with the Eastern Bengal Railway (owned and operated by the State since 1884). The mileage open of the Bengal & Assam Railway, according to the latest figures, comprises 898 miles on the 5 ft. 6 in. gauge; 2,543 miles on the 3 ft. 3½ in. gauge; 37 miles on the 2 ft. 6 in. gauge; and 32 miles on the 2 ft. gauge. Mr. Cuffe has been General Manager since the end of last

became General Manager of the Great Indian Peninsula Railway in 1940, which position he held until appointed to his present post. Mr. Cuffe is President of the Indian Railway Conference Association for 1944-45.

On account of pressure of other duties, Mr. Allan Miller has resigned from the board of the Brush Electrical Engineering Co. Ltd.

Mr. W. L. E. Short, Manager of the Dumbarton Works of Babcock & Wilcox Limited, is retiring at the end of the year, and will be succeeded by Mr. W. P. Ross, at present Assistant Manager.

The Irish Tourist Board has appointed Mr. Fintan Lawlor as Secretary. Mr. Lawlor has been Senior Engineer & Chief Inspector to the Board, and he retains the latter position.

Mr. D. A. Oliver, Research Director of William Jessop & Sons Ltd. and J. J. Saville & Co. Ltd., has been appointed also Director of Research to the Birmingham Small Arms group, of which those companies form part.

The late Sir Joseph G. Broodbank, who was a member, appointed by the Board of Trade, of the Port of London Authority, and Chairman of the Dock & Warehouse Committee, from 1909 until his retirement from the Authority in 1920, and President of the Institute of Transport for 1923-24, left £51,695.

Mr. A. H. C. Page, B.Sc., M.I.Loco.E., has resigned his position as Chief Works Metallurgist, Chief Mechanical & Electrical Engineer's Department, L.M.S.R., which he has held since 1935, to take up the appointment of Technical Representative of the Empire Rubber Company, Dunstable, covering the Birmingham and Coventry area. Mr. Page was awarded the Trevithick Prize of the Institution of Locomotive Engineers in 1938.

INSTITUTION OF CIVIL ENGINEERS

Among those recently transferred from associate membership to membership of the Institution of Civil Engineers are Messrs. W. H. Bundock, Way & Works Department, Buenos Ayres Great Southern Railway; M. A. Henry, Divisional Engineer, Neath, Great Western Railway; and T. R. Tyagarajan, District Engineer, Madras & Southern Mahratta Railway.

The following announcement appeared in the Supplement to *The London Gazette* of November 10, under the heading of Territorial Army—Royal Engineers: Engineer & Railway Staff Corps:—

Major D. E. Cameron (62377) to be Major, November 9, 1944, with seniority, March 3, 1943.

In the Second Supplement to *The London Gazette* of November 7, under the heading



Mr. G. E. Cuffe

General Manager, Bengal & Assam Railway, who is returning to India from leave

year. He was educated at Marlborough, and at Jesus College, Cambridge, where he obtained the Honours B.A. in Engineering in 1914. He served with the Royal Engineers (Signals) in France from 1914-20; he attained the rank of Captain and was mentioned in dispatches. In 1920 Mr. Cuffe joined the former London & South Western Railway as a pupil, and gained varied and useful experience in the Traffic, Signal Engineer's and Electrical Engineer's Departments. He went to India as Assistant Traffic Manager of the Dibru-Sadiya Railway (which is owned by the Assam Railways & Trading Co. Ltd.) in 1923, and became Traffic Manager in 1924. In 1928 he was appointed Agent & General Manager in India of the Assam Railways & Trading Co. Ltd. In 1935 he was appointed Agent of the Assam-Bengal Railway, to which designation the title of General Manager later was added. Mr. Cuffe

of Territorial Army — Royal Engineers, it is announced that Major Cameron relinquishes his commission, on account of disability, November 9, 1944, retaining the rank of Major.

Major Cameron is Dock Mechanical Engineer, Swansea & Port Talbot, Great Western Railway.

Sir Joshua Scholefield, K.C., has been elected Treasurer of the Middle Temple. Sir Joshua Scholefield is Chairman of the Railway Assessment Authority.

Mr. Norman Clark has been appointed to the boards of Darwins Limited, Andrews Toledo Limited, and the Wardsend Steel Co. Ltd.

Mr. B. L. Curran, Acting Secretary & Manager, County Donegal Railways Joint Committee, who, as recorded in our October 13 issue, has been appointed Secretary & Manager, was born in 1897. He entered the service of the Midland Railway, Northern Counties Committee (now L.M.S.R., N.C.C.), in 1913, from St. Malachy's College, Belfast, on appointment to the Accountant's Office (Audit Section). He acted as Assistant Examiner in connection with compensation under the Irish Railways (Settlement of Claims) Act, 1921. In September, 1936, he was appointed by the L.M.S.R., N.C.C., to be Receipts Investigator in connection with the transport pool arising from the Road & Railway Transport Act (Northern Ireland), 1935. Mr. Curran transferred to the County Donegal Railways Joint Committee in February, 1938, on being appointed Accountant; he was appointed Acting Secretary & Manager after the death of Mr. Henry Forbes in November, 1943, and is now confirmed in that position.



Mr. B. L. Curran

Appointed Secretary & Manager, County Donegal Railways Joint Committee



Mr. F. G. Gurley

Elected President & Chairman of the Executive Committee, Atchison, Topeka & Santa Fe Railway System

Mr. F. G. Gurley, Executive Vice-President of the Atchison, Topeka & Santa Fe Railway System, U.S.A., who, as recorded in our September 8 issue, has been elected President & Chairman of the Executive Committee, was born in 1889, and entered railway service as a clerk in the Superintendent's Office of the Chicago, Burlington & Quincy Railroad at Sheridan, Wyoming, in 1906. He was employed in various clerical capacities until 1911; thence he served in junior office positions in the Operating Department until 1920, when he was appointed Division Superintendent. Five years later he was promoted to be General Superintendent. In 1932, Mr. Gurley was appointed Assistant to the Vice-President; his title was changed to that of Assistant to the Executive Vice-President in 1935. He was made Assistant Vice-President in May, 1936, which position he held at the time of his election to the Vice-Presidency of the Atchison, Topeka & Santa Fe Railway System on June 1, 1939. He has served as a member of the Santa Fe board of directors since November, 1942, and of the executive committee since January, 1944. Mr. Gurley has served as a member of the boards of the Chicago & Western Indiana Railroad Company, Kansas City Terminal Railway Company, and other companies. He has been a witness in a number of important rate cases before the Interstate Commerce Commission. Mr. Gurley is the author of many papers on high-speed passenger trains and on diesel engines.

Mr. C. A. Samuels has been appointed Commercial Division Manager in charge of Home & Export Sales for the Glacier Metal Co. Ltd. Mr. P. T. Holligan is to

act as Technical Adviser to the Commercial Division. Mr. T. Rumble, Assistant Service Manager, has been appointed Regional Manager for the Western Area; and Messrs. W. H. Clarke and E. F. Gale have been appointed Technical Representatives.

Mr. A. S. Kirby, A.M.Inst.T., Assistant Chief of Divisional Trains Office, Office of Divisional Superintendent of Operation, Crewe, L.M.S.R., who, as recorded in our October 20 issue, has been appointed Divisional Controller (Passenger Services), Office of Divisional Superintendent of Operation, Crewe, was educated at Haberdashers' Aske's School, and afterwards graduated at London University. In 1918 he entered the service of the former L.N.W.R. in the Superintendent of the Line's Office, Euston. Between 1918 and 1928 he received training in the working of passenger stations, traffic yards, and district operating and commercial offices; and then for a year was engaged in connection with the development of the road passenger organisation of the L.M.S.R. In 1930-31 he represented the company in Germany, in an exchange of officers between the L.M.S.R. and the German State Railway, to study and report on railway conditions. He was appointed Assistant District Controller, Rugby, in 1931, and to the corresponding post at Willesden in 1933. From 1939 he was a lecturer on operating subjects at the L.M.S.R. School of Transport, Derby, until the outbreak of war, when he became Assistant District Controller, Chester (located at Birkenhead). From 1940 to 1942 Mr. Kirby was District Controller, Chester, and thereafter until the time of his present appointment has been Assistant Chief of Divisional Trains Office, Crewe.



Mr. A. S. Kirby

Appointed Divisional Controller (Passenger Services), Crewe, L.M.S.R.

TRANSPORT SERVICES AND THE WAR—273

Millions of Jerricans by Rail

Since 1943, when machinery was brought from the U.S.A. and set up in a disused factory in a town on the East Coast of Scotland, the L.N.E.R. has conveyed from that place alone some 7,000,000 Jerricans

Apart from the duplication of records, which was considerable, the loading of sheets back to the owner, and unloading sheets returned from other companies, involved an enormous amount of double handling. Under the present arrangement each company is permitted to condemn sheets no longer fit for traffic and to take them out of service, irrespective of ownership. The scheme was introduced originally as an experiment. It has now been in operation for six months, during which time 108,900 sheets have been dealt with, and has proved so successful that it is to be continued.

War Damage to Hungerford Bridge

The Southern Railway has announced that the Hungerford footbridge (the footpath alongside its railway bridge across the River Thames, approaching Charing Cross terminus) was reopened to the public during the hours of daylight from Novem-

achievement, of which we hope to be able to publish particulars in due course.

Further Cuts in U.S.A. Railway Steel

Severe cuts have been made by the United States War Production Board in the railway companies' requests for steel for maintenance and construction work. In the fourth quarter of 1944 the Office of Defense Transportation, as representing the railways, called for 1,532,633 tons of carbon steel for all purposes, but the W.P.B. has reduced this amount by over one-third to 1,039,100 tons. Steel rail allocations are now cut from 550,000 to 360,000 tons, and those for track accessories from 291,000 to 190,000 tons, on account of the Army demand for rails and shell steel. These quantities are considerably less than those previously reported, but the W.P.B. has advised that any easing of the military demand will be used to permit an upward adjustment of the railway tonnages. Among the building programmes to suffer are those for passenger rolling stock, for which extensive orders

CHRISTMAS PARCELS

Help the Railways to keep the lines clear for War traffic by sending as few Christmas parcels as possible

RAILWAY
EXECUTIVE COMMITTEE

Railway Executive Committee's
"Christmas parcels" poster

in 14,000 wagons to destinations in Scotland and England for filling with petrol. Many of these have been conveyed by ordinary goods train, but, since the traffic began, 350 special trains have also been run. In the months before "D" day more than 2,000,000 Jerricans were handled and dispatched in more than 4,000 wagons at this Scottish East Coast town.

Cheap Travel Warrants at Christmas

The Ministry of Labour & National Service has announced that, by reason of transport difficulties, the issue of cheap travel warrants to transferred agricultural workers will be suspended from December 21 to 27 inclusive, except in the case of workers from Northern Ireland and Eire who have obtained exit permits with sailing tickets or leave certificates endorsed by the police, valid in each case for a journey during that period.

Civilian Air Raid Casualties in November

The Ministry of Home Security has announced the following figures of civilian casualties due to enemy air action in the United Kingdom during the month of November:—

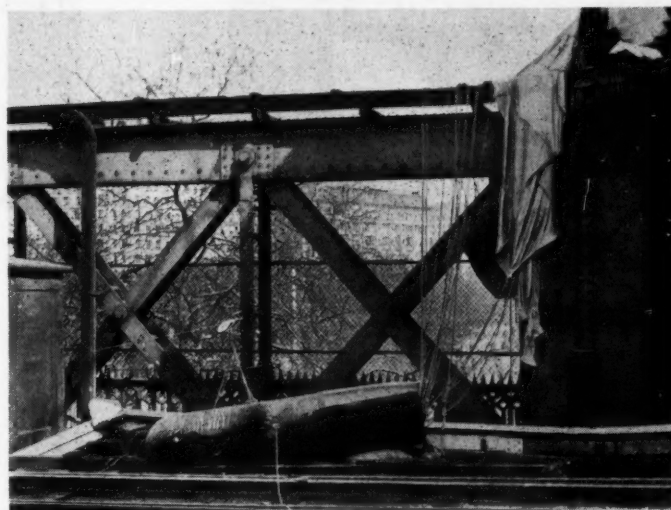
Killed (or missing believed killed)	716
Injured and detained in hospital	1,511

The casualties are classified as follow:—

	Men	Women	Under 16
Killed (or missing believed killed)	269	345	102
Injured and detained in hospital	515	799	197

Wagon Sheet Scheme Saves Transport

One of the more recent economies introduced by the British main-line railways, designed for the triple purpose of saving labour, transport, and wagons, is a scheme for the common condemnation of wagon sheets. Previously, each railway company was responsible for condemning and taking out of service its own wagon sheets. As a result, sheets no longer fit for use in traffic which were in the possession of one company, but belonging to another, had to be returned by the former to the owners.



Parachute landmine on Hungerford Bridge, at the end of Charing Cross Station, Southern Railway, in April, 1941

ber 29; it has been closed as a result of flying bomb damage since last June.

In the earlier days of the war, on the night of April 16-17, 1941, Hungerford Bridge was struck by a parachute landmine. After the air raid had been in progress on London that night for about six hours, this landmine dropped at the bottom of the signal-box steps, but did not explode. This signal-box, a crow's nest over Hungerford Bridge, was occupied by a signaller of 53 years of service, 40 of which had been at Charing Cross. Incendiaries had been falling freely and the station building and platform were well alight. Amidst the noise he did not know that the landmine had fallen at the bottom of his signal-box steps, and, when notified, decided to remain on duty in view of the value of his vantage point. The landmine was eventually found, on examination, to be fused to the electric conductor rail, as shown in our illustration above.

On June 18 of the present year, Hungerford Bridge was hit by a flying bomb, which demolished about 100 ft. of the up and down local lines and the footpath. Full details are not yet available for publication, but it may be said that the repairs constituted a noteworthy civil engineering

have been placed recently, for the first time for some years, to meet the acute shortage. For coach-building the O.D.T. had requested 6,488 tons of steel, but the W.P.B. has not conceded any of this tonnage.

Tyre Shortage in U.S.A.

While the critical shortage of large tyres continues, the United States Office of Defense Transportation is refusing to issue any permits for the inauguration of new inter-city bus services or extension of existing routes, and O.D.T. General Order No. 11 has been issued to give effect to this prohibition. In explaining the reasons for the Order, the General Director of the O.D.T. states that with many inter-city buses laid up and unable to operate because of lack of tyres, there would be no point in permitting the establishment of any new services, and the O.D.T. has no knowledge when any large size bus or lorry tyres will be available for replacement purposes. The tyre position became a little easier in August last, for there was a supplemental allotment by the Office of the Rubber Director of large bus and lorry tyres, making the total available 85,000, compared with the 165,000 estimated by the O.D.T. as urgently needed.

Comparisons of Station Nameboards and Poster Announcements

(See editorial article on page 615)



London Underground railway station nameboard and direction sign in 1921



Similar signs as designed by Edward Johnston, including his famous bar-and-circle device

UNDERGROUND

DISTRICT RAILWAY.

SOUTH ACTON STATION

In consequence of some Engineering Works at Mill Hill Park the South Acton Train Service will be suspended until 12.0 noon on Sunday, December 5th, 1909.

South Acton Station will, therefore, not be opened on that date until 12.0 noon.

A. H. STANLEY. General Manager. BY ORDER. 20/12/09


Typical poster announcement of the London Underground Group as issued in 1909

EVACUATION

June 13, 14, 15, 16, 17, 18

On each of the above days certain trains at this station will be reserved for the evacuation of school-children

The trains have been arranged so as to cause the minimum disturbance to ordinary services

LONDON  TRANSPORT

A London Transport wartime poster announcement of June, 1940, set in Johnston type

Mr. George Mills on Road and Rail

Mr. George Mills, Divisional General Manager, L.N.E.R., was the principal guest at the annual luncheon of the Railway & Traders Conference for Lincolnshire, held on December 6.

Mr. Mills said that the railway companies were desirous of restoring pre-war express passenger trains to cover business, residential, and holiday travel, and to re-introduce, as soon as possible, dining and sleeping-car facilities. They desired, when conditions permitted, to increase the average speed of trains. They were also intensely interested in the modernisation of passenger stations and the provision of amenities for the travelling public. The railways also fully intended making extensive additions to their existing railheads so that rail and road transport would be complementary.

He also referred to the propaganda of the British Road Federation. He stressed the fact that the railway companies provide their own track, but that the British Road Federation seemed to desire the expenditure of many millions of public money. The British Road Federation referred to the 70,000 people who had been killed, and the 2,500,000 injured in road accidents in ten years. Mr. Mills said that no one would minimise the tragedy of these casualties, but a railwayman might be permitted to state that the safest travel in the world was on the railways. Many post-war plans might be more difficult of accomplishment if millions of public money were diverted to the provision of roads, which, incidentally, would use about 12 acres of land per mile.

As a railwayman, therefore, Mr. Mills was confronted with demands for new roads (which were really competing railways), despite the fact that the existing railway tracks could carry the nation's commerce and the nation's passengers, and, in addition, was asked to contemplate accidents, although the railways were singularly free from these. He warned post-war planners to beware lest in the scramble for public money, the protagonists of roads, and still more roads, might not perhaps receive the lion's share.

Standards for Screw Threads

A report has been published recently on conferences held in 1943 in New York and in 1944 in London between engineers of the United States, Canada, and Great Britain, dealing with United States and British Standards for screw threads and limits and fits for engineering. These conferences were inaugurated by the Combined Production & Resources Board, established by the United States, United Kingdom and Canada to integrate the production programme of the three countries. The first conference in New York was arranged by the American Standards Association at the request of C.P.R.B. and the more recent one in London by the British Standards Institution at the request of the Ministry of Production. A British mission visited the United States to discuss and resolve problems relating to the production in America of Whitworth threads on munitions of British design and other threaded products. Representatives from Canada were invited also to participate.

In the American form of thread the difficulty of producing the Whitworth

form with rounded crests and roots, which involve special tooling problems, does not arise. To avoid this difficulty, the truncated form of Whitworth thread was proposed by the American delegates. The British mission advised as to the desirable tolerances applicable to this modified thread and it was agreed that American and British specifications should be produced on common lines to cover the truncated Whitworth thread.

During this conference, other thread problems were discussed, and a number of projects were initiated which would result in incalculable saving in material, in man-power and in the time required to commence production. The most important of these related to devising a common standard for screw threads, both for form of thread, diameter, and their related pitches. In this connection it was agreed that the matter should be considered actively in the United States, Canada, and Great Britain, so as to continue discussions at an early date.

After the return of the mission, the agreed programme was set in motion and an exchange of draft specifications and data took place between the standards authorities in the United States and Great Britain. In 1944 the Ministry of Production invited the C.P.R.B. and Canadian representatives to London to settle outstanding points. This mission arrived in August, and a series of conferences was arranged by Mr. S. J. Harley, Controller of Jigs, Tools & Gauges, of the Ministry of Supply (on behalf of the Ministry of Production), who organised and supervised the programme of work in conjunction with the B.S.I. and representatives of the production ministries and leading manufacturers. In addition, a number of meetings of sub-committees took place during the same period to study detail problems which arose out of the various conferences; results have been published in a report issued by the C.P.R.B. in the United States, Canada, and Great Britain, and copies can be obtained from the Director-General of Machine Tools, Ministry of Production, Dept. D.G.M.I., Caxton House East, Tothill Street, S.W.1. This report gives a summary of the various discussions which took place at the London conferences and the conclusions reached on the following subjects, prefaced in each case by an introduction giving the history and the present state of development in each of the three countries:—

Truncated Whitworth threads
Cylindrical fits
High-duty studs in light alloys
Pipe threads
Screw threads for compressed-gas cylinder outlets
Acme threads
Buttress threads
Instrument threads
Unification of screw threads
Design and drafting practice

TOOL AND SCREW THREAD PRODUCTION

A conference took place also with representatives of the British tap and die manufacturers at their request. An interchange of information took place between the American and British representatives covering the range of tool production for the various types of screwed products.

It was evident that this interchange of information had been very valuable and, as the co-ordination of thread specifications would demand a similar co-ordination of practice in production tools, it was considered that such interchange of information should continue to take place from time to time.

The Relationship Between Smokebox and Boiler Proportions

(Concluded from page 622)

smokebox vacuum, then it may be deduced that the vacuum is governed by the equation $S = Q^2 R^2$, as only this equation is affected by the resistance of the boiler.

Thus, if nearly closing the damper causes an appreciable increase in the smokebox vacuum, the engine is not suffering from having too large a chimney. If, on the other hand, closing the damper causes no appreciable increase in the smokebox vacuum, the vacuum is governed by the

equation $S = K \frac{Q^2}{A^2}$. Thus the vacuum is

limited because the chimney is too large to allow it to be increased to a higher figure.

Even if an engine can maintain steam under favourable conditions, it should be capable of producing an increased smokebox vacuum when required to cover the cases where clinker on the grate, etc., increases the resistance of the boiler.

To illustrate the use of these methods, consider three typical boilers, A, B, and C, having the dimensions and characteristics shown in Table I. Suppose an engine with the small boiler C has a chimney of 14 in. minimum diameter and suppose this engine is known to steam well. If this is taken as a basis whereby to fix the diameter of the chimney for a large engine with boiler A, and if D be the diameter of the chimney required, then

$$D^2 = \frac{28.2}{16.6} \times 14^2 \therefore D = 18.25 \text{ in.}$$

Or if a double chimney is to be used, as it would have to be, the diameter of each barrel of the double chimney would be 12.9 in. Similarly, on the same lines, boiler B would require a single chimney with a minimum diameter of 16½ in., or double chimneys each having a diameter of 11.7 in.

TABLE I

	A	B	C
Grate area (sq. ft.)	40	30	20
Length of tubes (ft.)	19	14	12
No. of small tubes	110	125	130
Outside dia. of ditto (in.)	2½	2½	1½
No. of flues	32	24	21
Outside dia. of ditto (in.)	5½	5½	5
No. of elements in each flue	4	4	4
Outside dia. of ditto (in.)	1½	1½	1½
Steaming capacity	28.2	23.2	16.6

Note.—Assumed small tubes are 11 S.W.G., flues are 7 S.W.G., and flues have reduced diameter ends

As to the effect of leakage through pistons and valves on the steaming of the boiler, it would seem at first sight that this leakage should improve the steaming, as leakage steam has to give up much less of its internal energy than steam which has performed work. In practice, however, it is found that leakage past pistons and valves is very detrimental to steaming. The author suggests that the explanation is as follows.

The action of the blast is intermittent and at low speeds is in the form of separate discharges. The column of gas passing through the tubes and up the chimney has a definite weight and therefore an inertia effect. When a valve opens to exhaust and the discharge commences the gases are accelerated and attain a certain velocity. The discharge of steam soon ceases, but the gases continue to flow through the tubes and up the chimney by their own momentum. Any leakage steam escaping from

the blast pipe between the puffs, with a velocity less than the residual velocity of the gases, reduces the velocity of the gases and impairs the production of steam, while at the same time the leakage is an additional demand on the steam produced in the boiler.

Whether this is the correct explanation or not, it has been observed that when an engine fails to steam when working heavily at low speeds it is generally due to piston and valve leakage.

Notes and News

Leopoldina Railway Co. Ltd.—Although the registered office of the company will remain at 80, High Street, Sevenoaks, Kent, all correspondence should be addressed to 3, Lombard Street, London, E.C.3. Telephone: MANSION House 5895-6.

Midland Railway Co. of Western Australia Limited.—The directors have authorised a final payment of interest on the second mortgage cumulative income debenture stock on account of the year ended June 30, 1944, at the rate of 3 per cent., less income tax at 10s. in the £, payable January 1, 1945, making with the interim payment of 2 per cent. on July 1, 1944, 5 per cent. for the year.

L.N.E.R. Canteen at Ardwick East Goods Depot.—The 118th L.N.E.R. canteen was opened, at Ardwick East Goods Depot, Manchester, on November 28 by Mr. A. F. Moss, District Superintendent, Manchester. It will be open continuously, except on Sundays, and has accommodation for 248. It is expected that the maximum number of meals served during midday will be 445. Present at the ceremony were:—

L.N.E.R.: Messrs. H. Kinsley (Chairman), Goods Agent, Ardwick; A. Canning, Yardmaster, Ardwick; F. W. Wheddon, District Passenger Manager, Manchester; H. S. Owen, District Goods Manager, Manchester; and R. Ockenden, Canteen Supervisor; also Messrs. C. H. Baxter, John Gardner (London) Limited; J. Burton, Secretary, Manchester No. 6 Branch, R.C.A.; J. Singleton, Secretary, Ardwick No. 1 Branch, N.U.R.; J. T. Smith, Secretary, Ardwick No. 16 Branch, N.U.R.; W. P. Caveney, Chairman, and J. H. Stuffs, Secretary, Clerical L.D.C. Ardwick Goods; and R. Brockbank, Chairman, Cartage Department, L.D.C. Ardwick.

The British Engineers' Association (Inc.)—At the annual general meeting on December 7, resolutions were adopted unanimously confirming the arrangements which had been made for the linking-up of the sectional trade associations with the B.E.A., and for their representation on its governing council. The Director of the Association, Mr. A. W. Berry, M.I.E.E., referred to the close contacts maintained with the appropriate government departments. The result of a ballot for vacant seats on the Council in the ensuing year was announced. The Hon. J. K. Weir, C.B.E., Managing Director of G. & J. Weir Limited, was elected as the new member. At the subsequent council meeting, the President, Mr. Cecil Bentham, M.Inst.C.E., M.I.Mech.E., M.Inst.T., was re-elected President. Lt. Colonel H. B. Riggall, J.P., Assistant Managing Director of Ruston & Hornsby Limited, and Mr. C. K. F. Hague, Deputy Managing Director of Babcock & Wilcox Limited, were elected vice-presidents. Sir Francis Joseph, Bt., Acting Chairman of the United Kingdom Commercial Corporation Limited, and Sir Charles Bruce-Gardner, M.I.Mech.E., Chief Executive for Industrial Reconversion

(B.o.T.), addressed members of the Association present at the luncheon in connection with the annual meeting.

Central Bus Terminus for Dublin.—A new passenger road terminus is to be built in Dublin on the site between Amiens Street and the Customs House which was formerly occupied by the grain stores of the Dublin Port & Docks Board. The selection of this site ends many years of hesitation and discussion. The plans entail the construction of a new thoroughfare extending Amiens Street as far as the River Liffey. The site covers a ground area of nearly 40,000 sq. ft., and is adjacent to the station of the Great Northern Railway.

Railway Benevolent Institution Collection.—A New Year's Day collection in aid of the Railway Benevolent Institution will be made on Monday, January 1, 1945, at all railway stations in Great Britain and Ireland. The number of railway employees who became members of this year's casualty fund is 183,247; and assistance has been rendered to 116 widows of men killed, 592 widows of men dying from illness, and 4,835 men accidentally injured, making a total of 5,543 cases relieved, or one in every 33 contributors. It is hoped that the travelling public generously will augment the contributions of the railwaymen.

Standard Screw-Threads.—Appealing to American engineers and industry to adopt international standards for screw-threads, Mr. William L. Batt, U.S. deputy member of the Combined Production & Resources Board, said, at a meeting of the American Standards Association, that differing standards in the U.S.A. and Great Britain had already added at least £25,000,000 to the cost of the war, and had caused incalculable production and repair delays. "While the matter of screw-threads may seem like a rather simple and work-a-day matter to the average man," Mr. Batt said, "It is not realised that in many cases British and American gun parts—or parts for other items—are not interchangeable even though the completed products themselves are of identical design?"

Crompton Parkinson Limited.—In the report for the year to September 30, 1944, it is shown that the profit from trading, dividends on investments, etc., after making provision for war damage contributions, E.P.T., income tax and contingencies, was £460,099 (£459,163). Deducting £25,000 for depreciation and £3,000 for directors' fees leaves a net profit of (£432,099 (£431,413) to which has to be added £488,657 balance at September 30, 1943, making £920,756. Preference dividends, subject to tax, take £43,658, £5,000 is allocated to benevolent fund, the total dividend for the year on the ordinary and "A" ordinary stocks is 15 per cent. actual, requiring £585,256; and a cash bonus of 7½ per cent. on the two ordinary stocks takes £94,614, leaving £588,256 to be carried forward as "profits unappropriated."

The F. C. Coleman "Modern Transport" Award.—The council of the Institute of Transport has accepted the offer of the Modern Transport Publishing Co. Ltd. to donate an award of £50 a year to supplement the amount of the Silver Jubilee Scholarship. The award is announced in the following terms:—"The F. C. Coleman Modern Transport Award (founded in 1944, on the occasion of the Silver Jubilee of the Institute, by the Modern Transport Publishing Co. Ltd., in memory of the late Mr. F. C. Coleman's past efforts in transport education and the prominent part he played in the founding of the Institute of Trans-

port): £50 per annum for award to the Institute Silver Jubilee Scholar, on the understanding that it is his intention to follow a career in the world of transport, to assist him in the purchase of books and equipment for the pursuit of his studies."

South African Railways Record Weekly Earnings.—Earnings of the South African Railways for the week ended November 25 last eclipsed all previous figures with a total of £1,077,218. The figure for the preceding week was £1,045,576, and for the corresponding week of 1943 £889,075. The total revenue for the week from goods traffic, excluding coal and livestock, also represented a record; the figure was £603,425, compared with £598,493 for the previous week and £497,535 for the corresponding week of 1943.

Acquisition of Timpson Coaching Interests.—As a result of the death of Mr. Alexander Timpson, the shareholders in A. Timpson & Sons, Ltd. decided unanimously to dispose of their holdings in that company, of which he was Governing Director. These shareholdings have been acquired by the British Electric Traction Co. Ltd., Thomas Tilling Ltd., and certain companies in which both are interested. The present Directors of A. Timpson & Sons, Ltd. (which was incorporated on May 31, 1926, to acquire an old-established business) are: Colonel H. I. Robinson (Chairman), George Cardwell, F. B. Arnold, A. E. Cannon, and Raymond W. Birch. Mr. W. A. Timpson (hitherto a Director and Secretary of the company), has become General Manager. The head offices are now at Coastal Chambers, 172, Buckingham Palace Road, London, S.W.1. The pre-war fleet comprised 135 vehicles, of which 123 were A.E.C. motorcoaches, and 4 Leyland motorcoaches; there were also 4 lorries, and 4 private cars. The present fleet is believed to be somewhat smaller, and is fully employed on Government contracts.

Contracts and Tenders

Below is a list of the orders placed recently by the Egyptian State Railways:—

J. Spencer & Sons (1928) Ltd.: Volute springs.
George Spencer Moulton & Co. Ltd.: India, rubber drawbar springs.
Robert Hyde & Sons Ltd.: Buffer castings.
Clyde Rubber Works Co. Ltd.: India rubber drawbar springs.
Trier Brothers Limited: Lubricants.
Gresham & Craven Limited: Simplex cones.
Imperial Chemical Industries: Cables.
F. Smith & Co.: Copper wire.
Buck & Hickman Limited: Hand tools, screws.
W. & J. George Limited: Laboratory apparatus.
Tilley Lamp Company: Lamps.
C. C. Wakefield & Co. Ltd.: Check and test valves, etc.
S. Osborn & Co. Ltd.: Drills and reamers.
Marconi's Wireless Telegraph Co. Ltd.: Wireless telegraphic and telephone materials.
English Electric Co. Ltd.: Fibre tubes and high tension sheets, etc.
Crown Spring Co. Ltd.: Upholstery springs.
Marconi Instruments Limited: Precision wireless measuring apparatus.
Ericsson Telephone Limited: Plugs for switchboard.
A. Balfour & Co. Ltd.: Taps and twist drills etc.
Hart Accumulator Co. Ltd.: Lamps.
J. Stone & Co. Ltd.: Hose rivets.
Grover & Co. Ltd.: Washers.
Superheater Co. Ltd.: Clamp bolts.
Guest Keen & Nettlefolds Limited: Wood screws.
Charles Richards & Sons Ltd.: Nuts and bolts.